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IN THIS ISSUE

An Automatic Projectile Type Syringe

Field Evaluation of Hygromycin B

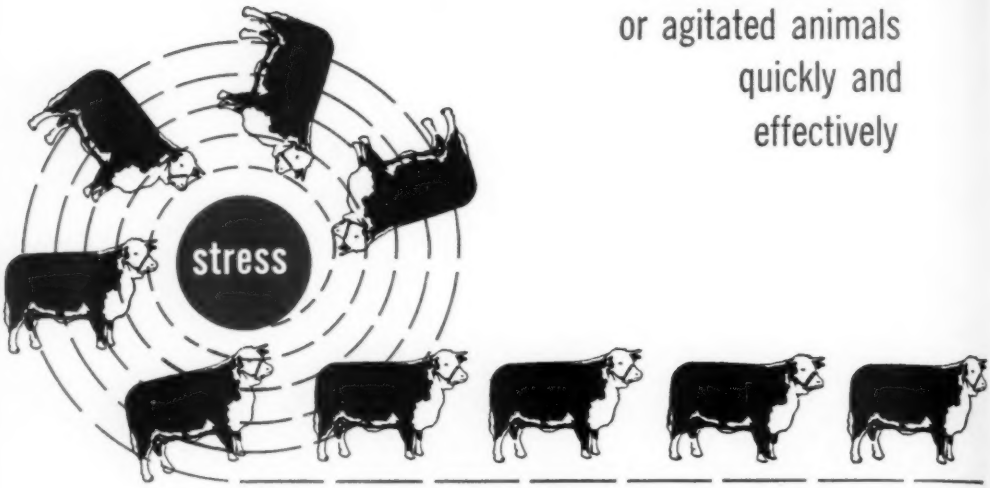
Normal Blood Values in the Beagle

Ringworm in a Dog Caused by Trichophyton Rubrum

Parenteral Enzyme Therapy

Complete Index on Page VI

relieves **environmental stress,**
unwinds excitable
or agitated animals
quickly and
effectively



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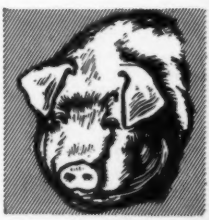

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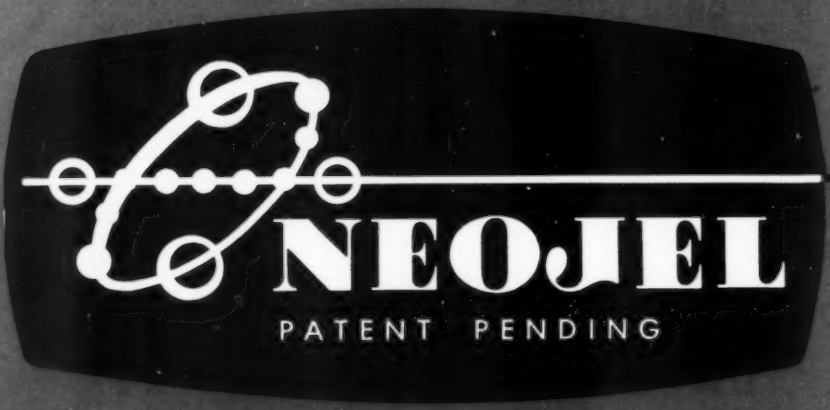

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General Practice

An Automatic Projectile Type Syringe 115
JACK A. CROCKFORD, B.S., FRANK A. HAYES, D.V.M., JAMES H. JENKINS, Ph.D., and SELDON D. FEURT, Ph.D.
Methods for propulsive administration of drugs to effect immobilization of feral animals, until recently, have been no more advanced than technics used by the Jivaro Indians for centuries. Presented here is discussion of both new projectile syringe drugs employed and a method for its delivery.

Field Evaluation of Hygromycin B as an Ascaricide in Swine 120
GEORGE W. KELLEY, JR., Ph.D., LELAND S. OLSEN, Ph.D., LAVON SUMPTION, Ph.D., and JAMES C. ADAMS, B.Sc.
Although extensive trials have been conducted on the use of this relatively new antibiotic, little mention has been given to it in veterinary literature. The authors report results of a set of experiments designed to reveal the comparative value of hygromycin B with other anthelmintic and antibiotics as to rate of gain and efficiency of feed utilizaion. This work suggests that considerations that may not be obvious to caretakers are likely to influence results.

Professional and Therapeutic Rationale of Tranquilizers 127
R. C. WILLIAMS, D.V.M., and J. E. YOUNG, D.V.M.
Practitioner authors give analytical review to the broad clinical benefits of employment of ataractic drugs. Species of domestic animals and pets are considered.

Low-level Phenothiazine Administration in a Cow and Calf Program 131
GEORGE E. CAUTHEN, M.S., D.V.M.
A feeding program that includes addition of an anthelmintic continuously has a double purpose; to reduce numbers of or free animals of their parasite burdens, and to reduce premise contamination. The author discusses practical aspects of the program for cattle and reports variation in test results.

Small Animal Practice

Normal Blood Values in the Beagle 135
A. C. ANDERSEN, V.M.D., Ph.D., and WILLIAM GEE, B.S.
Observations of the authors suggest that normal blood values for dogs are incorrectly reported in veterinary literature. Extensive study of a large group of Beagles receiving a carefully prepared diet and managed to maintain optimum health reveals significant increases in values studied above those considered for dogs in normal health.

Ringworm in a Dog Caused by Trichophyton Rubrum 139
WILLIAM KAPLAN, D.V.M., and ROBERT H. GUMP, D.V.M.
The authors (Doctor Kaplan associated with the Mycology Section, U. S. Public Health Service; and Doctor Gump, practitioner specializing in pet animal practice in Wichita, Kans.) jointly report a case of ringworm confirmed to be caused by the common fungus T. rubrum *responsible for athlete's foot in man. This is the first such case reported in the United States.*

FIRST IN PROGRESS...THROUGH RESEARCH
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Parenteral Enzyme Therapy with Streptokinase—Human Plasminogen—Streptodornase 143
H. LINCOLN ESTERBROOKS, D.V.M., M.S.
The author summarizes exhaustive studies of the proteolytic action of substances. He discusses a combination having proved desirable action both as a prophylactic and treatment agent. Indications for its use are listed.

The History of Some Current Problems in Animal Disease VII. Rabies 149
J. F. SMITHCORS, D.V.M., Ph.D.
Doctor Smithcors, author of Evolution of the Veterinary Art, *presents another of his series of papers appearing in* VETERINARY MEDICINE, *of which this is the seventh, that deal with the history of certain diseases of animals commonly referred to practitioners today. Discussion of rabies will be continued in subsequent issues.*

Catnip 155
W. R. McCUISTION, D.V.M.
Dried catnip leaves, flowers, and seeds may serve as appetizers, or aid in preventing spells of nostalgia in cats confined away from home.

Editorial Comment

Effects of Artificial Light on the Avian Eye 119
Immunity to Fungus Infection 126
Hormone Implants in Pasture Cattle 134
Cyclopropane Anesthesia of Choice in Shock 142
Test Your Tax I.Q. 148
Toxoplasmosis: A Serious Portozoan Disease 154
Livestock Growers Evaluate the Veterinarian 157
Susceptibility to Cancer 159
Former President of A.V.M.A. Succumbs in Indiana 160
Dean R. S. Sugg Suffers Fatal Stroke at Alabama 160
Cornell Veterinary Conference 162
Equine Practitioners 163
Cutter Laboratories Assessed in Vaccine Case 164
Modern Standards of Medical Care for Animals 164
Dicumarol as an Anticoagulant 165
Protecting the Public Against Nuclear Radiation 166
Grass Tetany 167
Poultry Diseases 168
Preparation of Blood Smears 170
Practitioner's Bookshelf 172
Reader's Service XLIV
Veterinary Calendar LII
Deaths of Veterinarians LIV

Vol. 53 March 1958 No. 3

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DEVELOPMENT IN SWINE AND BEEF CATTLE NUTRITION

T. J. Cunha, Ph.D.

The author reviews experiments and field trials designed to test the practical application of new facts revealed concerning antibiotics, enzymes, proteins, vitamins, and minerals for animal feeding.

EVALUATION OF RANGE BULLS FOR BREEDING SOUNDNESS

H. J. Hill, D.V.M.

Doctor Hill draws on his exhaustive experience to outline proved technics for examination of bulls for breeding soundness.

SOME PRINCIPLES OF CLIENT RELATIONS

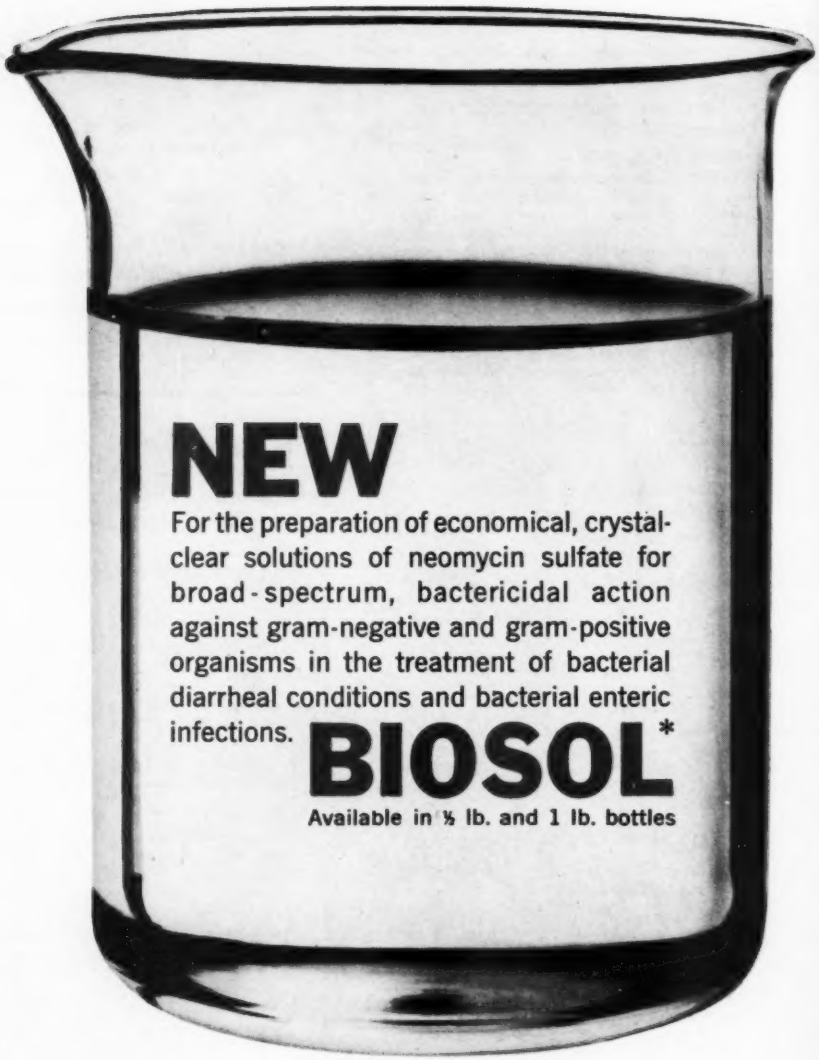
Kenneth B. Haas, Sr., Ed.D.

Educator, lecturer, and author, Doctor Haas (co-author of Business Practices in Veterinary Medicine) emphasizes that the consuming problem of client relations is as important to the success of practitioners as are technical skills applied by these men.

ECONOMICS OF A LARGE ANIMAL VETERINARY PRACTICE

D. R. Mackey, D.V.M.

Results from surveys concerning business practices in veterinary medicine suggest that veterinarians reexamine their costs and fee schedules. The author provides a new concept of business ratios.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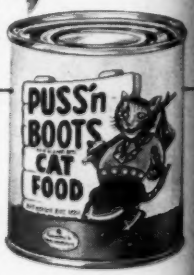

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*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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REFERENCES: 1. Bull, W. S.: N. Amer. Vet., In press. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., In press.

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NEOTHION . . .

SAFE, FAST AND EFFECTIVE FOR TREATMENT OF

- all known types of bacterial mastitis, both chronic and acute
- mastitis caused by bacteria which have become resistant to other antibiotics, or which other antibiotics are unable to control
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NEOTHION . . .

- no undesirable side reactions
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- made with exclusive Squibb Plastibase® for rapid release of antibiotics, ease of application and proper consistency.

NEOTHION IS THE NEWEST BROAD SPECTRUM FORMULATION ON THE MARKET TODAY. ONLY NEOTHION CONTAINS THIOSTREPTON TO PENETRATE THE MASTITIS "RESISTANCE BARRIER"

COMPARISON OF ACTIVITY OF SPECTRUM	GRAM-POSITIVE BACTERIA			GRAM-NEGATIVE BACTERIA					
	STAPHYLOCOCCI	PNEUMOCOCCI	STREPTOCOCCI	NISSERIA	SHIGELLA	COLIFORMS	HEMOPHILUS	PROTEUS	PSEUDOMONAS
Triple Sulfas									
Penicillin									
Streptomycin									
Neomycin									
Brand A (BROAD SPECTRUM ANTIBIOTIC)									
Brand B (BROAD SPECTRUM ANTIBIOTIC)									
Brand C (BROAD SPECTRUM ANTIBIOTIC)									
NEOTHION									

Neothion is available from your SQUIBB branch or your ethical wholesaler. Neothion is sold *only to veterinarians.*

NEOTHION® and PLASTIBASE are Squibb trademarks.

DOSAGE **Acute mastitis:** contents of 1 syringe of Neothion in each infected quarter every 12 hours or after each regular milking. Inflammation generally subsides and milk regains normal appearance after 1 to 6 infusions.

Chronic mastitis: contents of 1 syringe of Neothion in each infected quarter every 12 hours or after each regular milking. Continue treatment for 1 to 3 instillations or until milk regains normal appearance and other signs of infection disappear.

SUPPLY **Neothion Veterinary is supplied in 1-dose syringes containing 50,000 units of Thiostrepton plus 150 mg. of Neomycin.**

for additional information, write
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STREPTOKINASE—HUMAN PLASMINOGEN—STREPTODORNASE

Dog with chronic, generalized, bacterial dermatitis. Nose lesion was 4 years old—treated with ointments, antibiotics, lotions and cautery without effect.

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VARIZYME should be accompanied by systemic antibiotic therapy – POLYOTIC® Tetracycline or AUREOMYCIN® Chlortetracycline.

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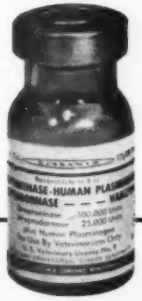

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Quantity	Package
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AMERICAN CYANAMID COMPANY, NEW YORK 20, N. Y.

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Some problems will solve themselves—on a "Don't look, maybe it will go away" sort of basis. Others can be swept under the rug.

Unfortunately, the indiscriminate use of veterinary biologics by untrained persons doesn't fall in either of these categories. It is definitely on the increase, as more and more suppliers are selling through non-professional outlets.

We see this as a detriment to the livestock industry and to your chosen profession. Since we sell only to the graduate veterinarian, we believe your position in this matter is the same as ours.

There is no place in livestock disease control for double talk. It's time to call a spade a spade. Frankly speaking, it's pretty much up to all of us as to what—if anything—can be done about this problem.

Muscles that aren't used atrophy; those that are used increase in size and tone. It is the same way with suppliers of veterinary products . . . and your orders are the only way we have of knowing which side of this issue you're on.

So the next time you place an order, ask yourself this question: "Could this order help or hurt the future of my profession?"

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News Comment

Concentrated Whole Milk

Though hailed as a major accomplishment in milk processing, concentrated milk is essentially no more than a palatable evaporated milk. It promises no bonanza to dairy farmers.

It is claimed that the sterile concentrate is so good that it can replace fresh whole milk at a small saving per quart. Dairymen in rural areas far removed from metropolitan consumers may benefit economically as this process is developed, but only at the expense of fluid milk producers adjacent to these large whole milk consuming areas.

Veterinary Students

There are 1,037 freshmen enrolled in the professional curriculum of veterinary schools and colleges in the United States. Of these, 231 have earned B.S. degrees and 11 have M.S. degrees in other fields. All have completed at least two years of college work.

Straphyloccus Aureus

Straphyloccus aureus, the causative organism of staphylococcal pyoderma, has become a major problem in some of the nation's finest hospitals and nurseries. The organism has apparently acquired considerable resistance against some antibiotics to which they were previously susceptible.

Forces of Nutrition Research

Dr. George M. Briggs of the National Institute of Health, Public Health Service, Bethesda, Md., points out (Feedstuffs, Dec. 28, 1957) that there are now well over 200 nutrition laboratories in the United States and Canada conducting research on basic and applied problems of animal nutrition. In these are 600 to 1,000 qualified investigators working toward a better understanding of the nutritional needs of all classes of livestock.

Only 30 to 50% of major nutritional findings of value have been revealed; perhaps only 10 to 20% in the area of basic animal nutrition is now known.

Anthelmintic for Swine

Hygromycin B, an antiobiotic having anthelmintic properties developed by the Agricultural Products Division, Eli Lilly & Co., Indianapolis, has now been cleared for continuous feeding to all weights and ages of swine, including breeding stock. It was previously recommended for growing pigs up to 100 lb.

Integrated Production and Marketing

Cooperation among four business elements—feeder, packer, feed manufacturer, and dealer—constituted an arrangement designed by the Staley Milling Co., Kansas City, Mo., to integrate swine production and marketing.

Basic structure of the program is this: Participating packers contract to buy at a market premium, production of feeders who follow the management and feeding plans outlined by Staley; nailed to this framework are many details to assure a workable overall plan.

Turkey Crop

For the country as a whole, the prospective turkey crop for 1958 is 81,000,000 birds. Turkey growers over the nation will raise about 3% more heavy breed turkeys and 11% fewer light breed turkeys than in 1957. Birds of the heavy white breeds will show no change in number. In 1957 heavy breed turkeys accounted for 83% of the total, and white heavy breeds constituted 22% of all heavy breeds.

Surplus Commodities

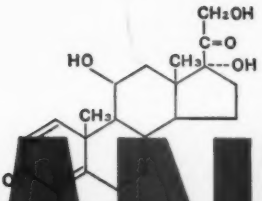
Movement of surplus farm products from Commodity Credit Corporation stocks into consumption continued at record levels during 1957. Surplus commodities having a cost value of $5,300,000,000. were disposed of during the 15-month period ending Sept. 30, 1957. The last lot of 155,000,000 lb. of wool which had accumulated in government warehouses by November 1955 was sold late last year, ending any market effect these holdings might have had since that time.

Infectious Avian Hepatitis

A newly described disease among New York laying flocks was discussed by Dr. M. C. Peckham at the Cornell Conference in January. The disease appears as an insidious infection causing a slow drop in production and feed consumption in pullet flocks.

Decade of Miracles

U. S. News and World Report so labeled the past decade and cited a long list of developments. Not the least of these are medical items, particularly those classified as hormones, vaccines and enzymes.



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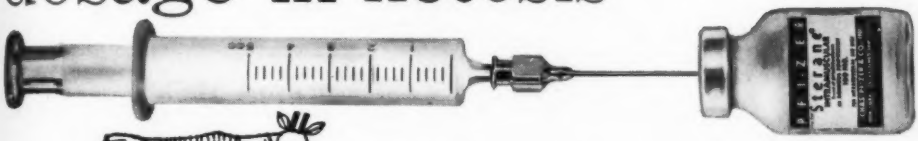
According to a recent report:*

high cure rate with low dosage in ketosis

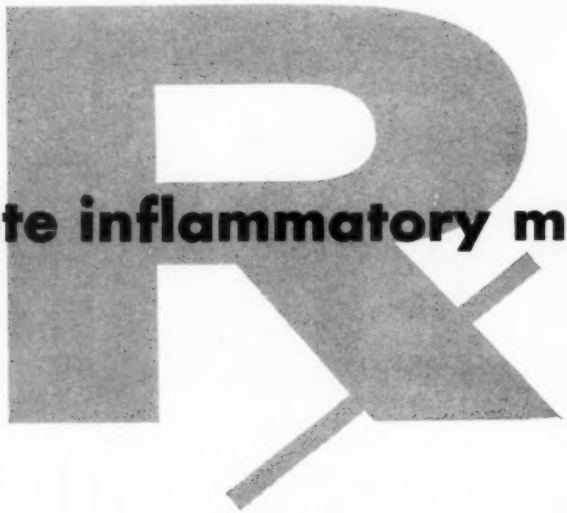


...87% of cases of primary ketosis cured with a single injection of only 50 to 100 mg. of Sterane Intramuscular

Available, to veterinarians only, in vials of 10 cc., each cc. containing 10 mg. of prednisolone.

*Link, R. P.; Newton, D. I., and Huber, W. G.: The Use of Prednisolone in Bovine Ketosis, paper presented at the 93rd Annual Meeting, A.V.M.A., San Antonio, Texas, Oct. 15-18, 1956.

Pfizer *Department of Veterinary Medicine*
PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N. Y.



in acute inflammatory mastitis

℞ Soxipent

with the antiinflammatory agent, hydrocortisone

Each cc. contains:

Hydrocortisone Acetate	2 mg.
Procaine Penicillin G	10,000 units
Erythromycin	5 mg.
Neomycin (as sulfate)	5 mg.
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Sulfisoxazole	75 mg.
Cobalt Sulfate	0.5 mg.

Now **2** *formulas:*

℞ Soxipent
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Soxipent

Now, as a companion to regular Soxipent, Fort Dodge offers new Rx Soxipent—an exclusive formula for professional use. Specifically indicated where quarters are highly inflamed, swollen, and engorged . . . when used early, gangrenous mastitis cases may be prevented. *In 100 cc. vials, 12 cc. syringes, and 10 cc. tubes.*

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SAFE

INJECTABLE LAXATIVE

Gallogen* acts promptly and directly on the hepatic cells to stimulate production of true whole bile. It has a secondary action stimulating emptying of gall bladder.

Gallogen* is safe to use in the recommended doses; no toxic effects have been noted.

Supplied: 30-cc. multidose vials, each cc. containing 50 mg. of Gallogen.*

Dosage: Intramuscular or intravenous administration. Cattle—500 mg. (10 cc.) Sheep and Swine—200 mg. (4 cc.) Dogs and Cats—50 mg. to 100 mg. (1 cc. to 2 cc.)

(*Diethanolamine salt of paratolylmethylcarbinol camphoric acid ester.)

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save safely on hog cholera vaccinations

SWIVINE is completely nontransmissible and cannot cause a disease outbreak or regain virulence by back passage.

SWIVINE has a distinct margin of safety over vaccines derived from blood or laboratory tissues of swine, because the Swivine virus is modified by hundreds of passages through rabbits, which are not a natural host to any swine disease. Therefore, Swivine cannot infect vaccinated pigs with any other swine disease.

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IN LARGE OR SMALL HERDS.....

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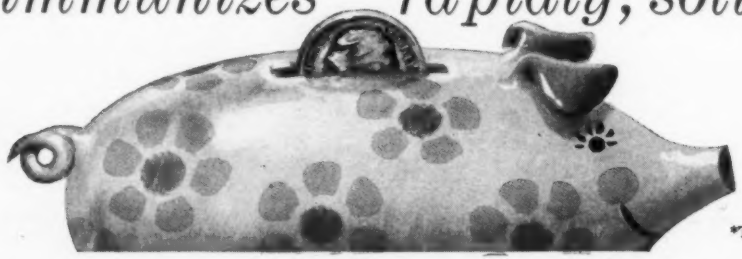
immunizes rapidly, solidly



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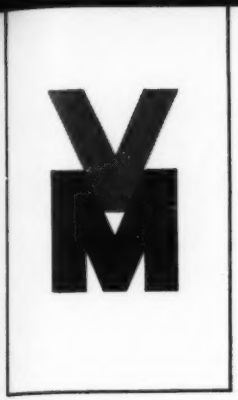


The necessity for immobilization of feral animals has prompted development of a projectile syringe and a method for its delivery. A discussion of this equipment was first presented before the 50th Annual Conference for Veterinarians, Auburn, Alabama, July 19-22, 1957, and the 94th annual meeting of the American Veterinary Medical Association, Cleveland, Ohio, August 19-22, 1957 A description of a more effective and later model of the syringe was given at the Research Conference on Causes, Effects and Control of Stress of Livestock, Kansas City, Missouri, sponsored by the Jensen-Salsbery Laboratories, December 10, 1957.

An Automatic Projectile Type Syringe

JACK A. CROCKFORD, B.S., FRANK A. HAYES, D.V.M.
JAMES H. JENKINS, Ph.D., and SELDON D. FEURT, Ph.D.

Georgia Game and Fish Commission, and
Schools of Veterinary Medicine, Forestry, and Pharmacy
University of Georgia
Athens, Georgia

MAN has long sought to deliver various fatal, immobilizing or paralytic drugs from a distance into the circulatory system of animals. Strophanthus[1] (Kombe arrow poison) and curare[2] (South American arrow poison) have been the compounds of choice for this purpose. The major objective of the procedure has been to kill the subject by propulsive drug induction. Certain primitive tribes of Africa and South America have perfected the technic to a point which has excited the imagination of many investigators.

Within the past decade research workers of the United States[3] and England[4] have explored the potentialities of various strychnos extracts for immobilizing wild animals for live capture. The curare-like compounds were abandoned for this purpose, however, because of the narrow therapeutic index resulting from the fixed dose required by propulsive delivery.[5] After further study with other alkaloids from this plant group (Strychnos sp. and Chondrodendron sp.), a fair degree of success was reported from the use of certain strychnine salts for the capture of white-tailed deer (*Odocoileus virginianus*).[6] Mortality was still in excess of 50% with losses from this approach exceeding that necessary for practical applications. The use of salts from Strychnos nux vomica was discontinued and an extensive screening program for other drugs possessing the necessary qualities was thereafter conducted.

After evaluating more than 100 likely products and drug combinations, nicotine was selected for field trials. The means for drug delivery have been described; however, as shown in these and other reports, the methods for propulsive administration were advanced little beyond those presently used by the Jivaro Indians.[7-9] Although more than 200 wild deer were caught with nicotine salicylate administered on darts the limited applications of the procedure became increasingly apparent.[9] With this method the necessity of drug induction as a semisolid was essential and, above 225 pounds body weight of subject to be captured the technic presented great mechanical difficulties. Considering the slow speed of induction resulting from the absorption of a paste, it was evident that the delivery of

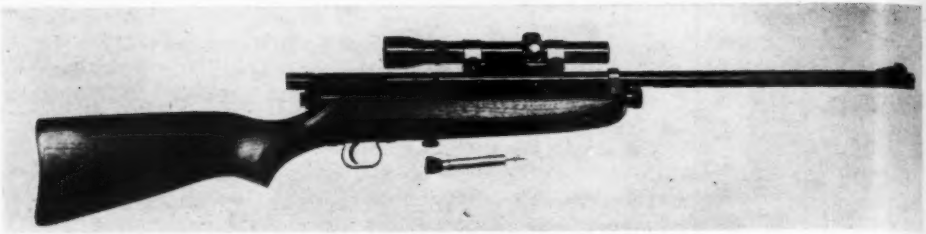


Fig. 1. Gas (CO_2) operated rifle modified for the specific purpose of propelling the projectile syringe.

nicotine as a solution was necessary to expand the application of the technic for use in larger animals.

Following experimentation with springs, inertia devices, water jackets, combustion chambers, et cetera, a "flying type syringe" was contrived for delivering a solution into the musculature of animals. A rifle for projecting the missile also was devised. Concurrent with the development of these instruments many previously obscure avenues were opened for capturing and restraining wild and feral animals. This first effective and practical automatic projectile syringe and a method for its delivery are discussed in this report.

Instruments

Syringe. A diagram of the projectile is illustrated (fig. 2) which should aid in describing the mechanism of operation. The syringe was designed for ruggedness and positive action. The barrel was constructed of aluminum and a stainless steel needle (13-16 gauge) was pressed into the anterior base of the cylinder and extended into the chamber. Approximately midway on the needle shaft a brass collar was pressed to facilitate holding in the flesh of the animal until the drug was inducted. Into the posterior barrel of the syringe a screw-type base or "tail piece" was inserted. This part was made for adequate projection with a nylon fiber skirt attached for stabilization in flight. The base was constructed to accommodate a neoprene "O-ring" for sealing gas pressure necessary for the forward motion of the plunger.

Mechanism of induction involved a half-hollowed, rubber piston, which was inserted at a given distance to separate the anterior or drug carrying chamber from the posterior or combustion chamber. A gas-forming chemical (calcium carbide, sodium bicarbonate with citric acid, et cetera) was placed within the hollowed portion of the rubber piston and sealed with a brass plug. Water (approximately 0.5 ml.) was induced posterior to the plug and the compartment was sealed with the neoprene fitting on the base. The brass plug served to separate the chemical from water, and through inertia of forward motion the gas-forming components were brought together [H_2O + CaC_2 or $NaHCO_3$ — $COOH.C(OH)(CH_2COOH)_2 \longrightarrow$ gas under compression]. Acetylene or carbon dioxide was rapidly formed behind the plunger, and forward motion with subsequent ejection ensued. All moving

TABLE 1. Experimental Data on the Delivery Potentials of the Automatic Projectile Type Syringe for Various Species of Animals

Experimental Animals	No. subjects	No. "hits"	Vol. adm. ml.
Goats (*Capra hircus*)	27	80	1-5
White-tailed Deer (*Odocoileus virginianus*)	61	70	2-5
Dybowski Deer (*Cervus nippon*)	2	6	3
Cattle (*Bos taurus*)	38	105	1.5-5
Zebu (*Bos indicus*)	1	1	3
Bison (*Bison bison*)	1	5	3.5
Tapir (*Tapirus terrestris*)	1	1	3
Kodiak Bear (*Ursus middendorffi*)	1	4	3
European Brown Bear (*Ursus arctos*)	1	4	3
Lion (*Felis leo*)	2	2	2.5
Tiger (*Felis tigris*)	2	2	2.5

parts and threads were treated with silicon lubricant when each syringe was assembled.

Rifle. A photograph of the instrument for syringe delivery is shown (fig. 1). This mechanical appliance was selected for simplicity of operation, accuracy, performance, and reliability in field operations. The instrument is a gas (CO_2) operated rifle (Crossman Arms Co., Rochester, New York), which was designed to accommodate a 50 caliber projectile syringe. The necessary spring reinforcements and adjustments with other breech and bore modifications were made for propelling the described missile. (Palmer Chemical and Equipment Co., Atlanta, Georgia.)

Results

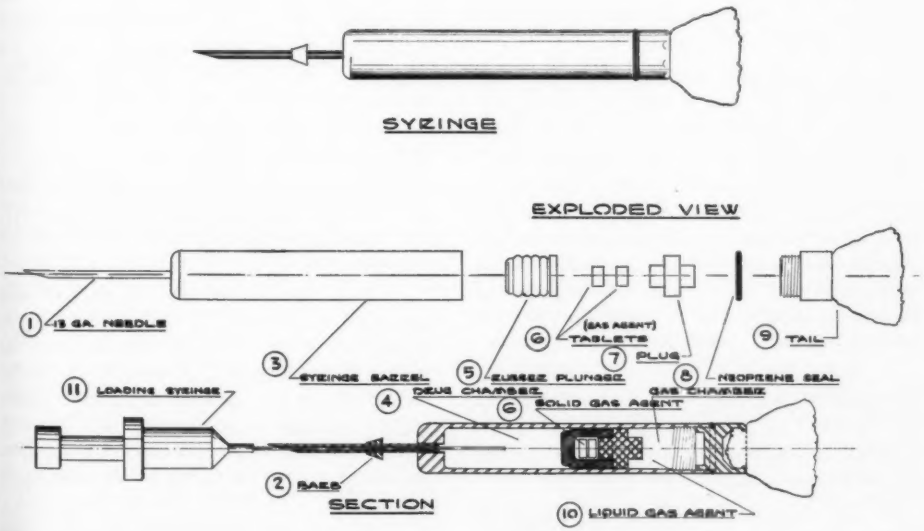
The projectile syringe (see illustration), has proved to be highly effective in delivering various tranquilizers, general anesthetics, and paralysis-producing compounds into the musculature of animals. The experimental subjects have included a number of species (table 1), and from these data the problems of negative skin penetration or positive mechanical trauma appeared to be inconsequential. The table represents 282 consecutive "hits" with a successful drug induction of from 1 to 5 ml. of solution. These figures were indicative of complete drug delivery as measured in syringes of varying carrying capacity (1.5 to 5 ml. total volume).

The rifle or propulsion instrument was found adequate for many types of field work in the livestock industry and wild animal procurement enterprises. The maximum range of this device was in the vicinity of 75 yards; however, the maximum effective range was limited to 40 yards. The optimum effective range was 30 yards, from which a "hit pattern" within 4 inches (diameter) was obtained. On many of the cited species closer shots were made at a minimum range of 5 yards.

Discussion

There are functional limitations to most mechanical devices and the instruments which have been described are not exceptions. From more than 10,000 trials with this equipment an explanation has been obtained for the majority of failures and, under the appropriate headings the major

Fig. 2. A Diagram illustrating the Mechanism for Operation of the Automatic Projectile Type Syringe.



reasons for sporadic mishaps are considered.

Syringe. Proper assembly of the projectile syringe is essential for desired efficiency. In itemized form these percautionary measures are discussed.

1. Care should be taken to assure that the combustion chemical [preferably $NaHCO_3$—COOH.C(OH) $(CH_2COOH)_2$] is active and that it has not been exposed to moisture. A partially deactivated compound will result in incomplete delivery of the drug to be administered.

2. In "loading the plunger" the contacts between the brass plug and posterior portion of the piston should be treated with a thin coat of silicon lubricant. By gently pressing the plug within the base of the piston, a tight seal will be obtained. The brass plug must be clean before seating in the piston.

3. Before inserting the plunger into the barrel of the syringe the exterior surface of the former should be treated with silicon lubricant and inserted and moved the length of the barrel before it is placed in a fixed position. Reversed movement can be accomplished by inducing a small rod into the lumen of the needle and pressing the plunger until it is in the correct location.

4. The piston should be seated approximately 1.3 cm. from the posterior part of the syringe barrel, thus allowing for 0.5 ml. of H_2O within the compartment delineated by the plunger and tail-piece.

5. An adequate amount of water (approximately 0.5 ml.) should be placed posterior to the seated piston. The entire space should be filled, as an excess of water in the combustion chamber is of little consequence.

6. The threads of the tail piece or base should be treated with silicon lubricant before insertion. This part of the syringe should be secured tightly with the neoprene O-ring properly fitted at the connection.

7. It should be reiterated that each moving part of the projectile syringe must be treated with a silicon lubricant. This precaution is easily neglected but it is an item of paramount importance.

8. The desired quantity of the drug to be administered is put into the anterior chamber by a hand syringe and small gauge needle. The syringe may be filled to the maximum carrying capacity of the drug chamber.

9. After 12 hours without usage the syringe should be dismantled and all parts thoroughly cleaned. "Misfires" may occur when a loaded syringe is held too long a period of time.

10. Worn-out or loose fitting pistons should be avoided. A rubber plunger will suffice for approximately 20 deliveries and should not be used thereafter.

11. On making a poor hit, an occasional cartilaginous or possibly bone "plug" will be cut by the needle, thus resulting in an occlusion of the needle bore. Under these circumstances the resistance of the stoppage may be in excess of gas compression behind the piston, and the latter can not move forward. This occurs infrequently and is governed by the ability of the operator to place the syringe into a muscular area.

Shoulder Arms

Rifle. The performance of any shoulder arm is usually in direct proportion to the experience and marksmanship of the operator. To an even greater extent this applies to the use of the described equipment and adequate practice is essential before any field application is anticipated. With the best of marksmanship, however, this instrument is limited in performance as contrasted to comparable firearms. These limitations are presented in itemized form.

1. For maximum efficacy this instrument must be kept clean, and a complete familarization with its principle of action should be obtained.

2. The function of any carbon dioxide operated implement is influenced by extremes in environmental temperatures. At temperatures between 32 and 95 F., the instrument can be expected to propell 15 projectile syringes from a single CO_2 charge. After this number of "rounds" have been discharged the CO_2 cylinders should be replaced.

3. For night work, a telescopic sight

greatly facilitates accuracy, and under certain conditions this visual aid is essential.

It is recognized that this presentation has been incomplete in many respects, with certain important questions pertaining to the description of the instruments remaining unanswered, *e.g.* quantity and ratio of the combustion chemicals, syringe dimensions, length and size of the needle, type of needle collar, et cetera. This has not been an oversight, however. Work is being conducted to determine these factors and conclusive answers have not been obtained.

Summary

In brief, this has been a report describing a principle whereby various drugs can be delivered as a solution from a distance into the circulatory system of an animal. Further experimentation is necessary and in progress for perfecting this automatic projectile type syringe and the rifle used for its delivery.

Acknowledgments

The development of the described instruments was supported by the Georgia Game and Fish Commission, Atlanta, the University of Georgia, Athens, and the Palmer Chemical and Equipment Co., Atlanta.

The authors are particularly grateful to Mr. Harold C. Palmer, president, Palmer Chemical and Equipment Co., for both his technical and financial assistance. Without the interest and cooperation of this individual, the development of the described instruments would not have been possible.

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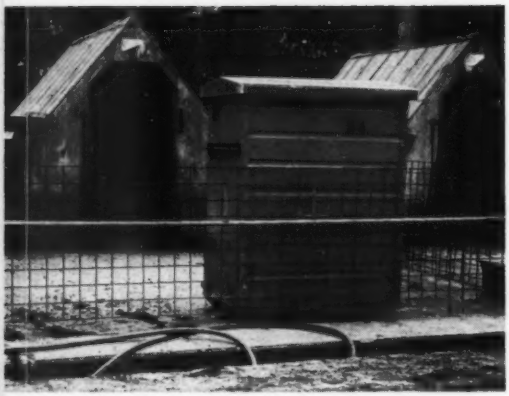
Effects of Artificial Light on the Avian Eye

During studies on the effect of different durations of diurnal artificial illumination on the growth of chicks, Jensen and Matson of the State College of Washington (*Science,* 125:741, Apr. 19, 1957) observed that the eyes of chicks subjected to continuous light appeared to be flattened. This condition was manifested by reduced depth of the anterior chamber and the apposition of the periphery of the iris to the cornea.

Additional studies were made of eyes of chicks subjected to 12 and 24 hours of continuous artificial illumination with a 60 watt incandescent lamp and sacrificed at six weeks of age for careful measurements. The average weight of eyeballs from chicks receiving continuous light was 38% greater than those receiving 12 hours of artificial light. When fluid was drawn from the anterior chambers of the eyes, about twice as much could be extracted from the eyes of chicks which had received continuous light showing that the major increase in weight was due to increased fluid.

No attempts were made to determine the mechanism of the development of the abnormality. The authors do suggest that the relationship of this light-induced abnormality to eye abnormalities in other species would be of interest.



In trials reported here, hygromycin B proved an effective ascaricide. Significant increase in efficiency of feed conversion is pointed out on relieving even light ascarid infections determined in test pigs.

Field Evaluation of Hygromycin B as an Ascaricide in Swine

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IN 1953, Pittenger *et al.*[1] reported on a new antibiotic, hygromycin, which was produced by *Streptomyces hygroscopicus* and which had activity against Gram-positive and Gram-negative bacteria. In 1957, McCowen *et al.*[2] reported that orally administered hygromycin effectively removed oxyurids of mice and destroyed *Endamoeba histolytica* in rats. Goldsby and Todd[3] reported on hygromycin as an anthelmintic for swine. These investigators found that hygromycin depressed egg production of Metastrongylus, Strongyloides, Trichuris and Oesophagostomum. They also had inconclusive evidence that egg production of *Ascaris suum* was depressed. Their results indicated that hygromycin may have an effective place in the swine industry as an anthelmintic. Later results have indicated that the anthelmintic action of hygromycin is primarily due to a fraction of the fermentation product designated hygromycin B.[4]

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Materials and Methods

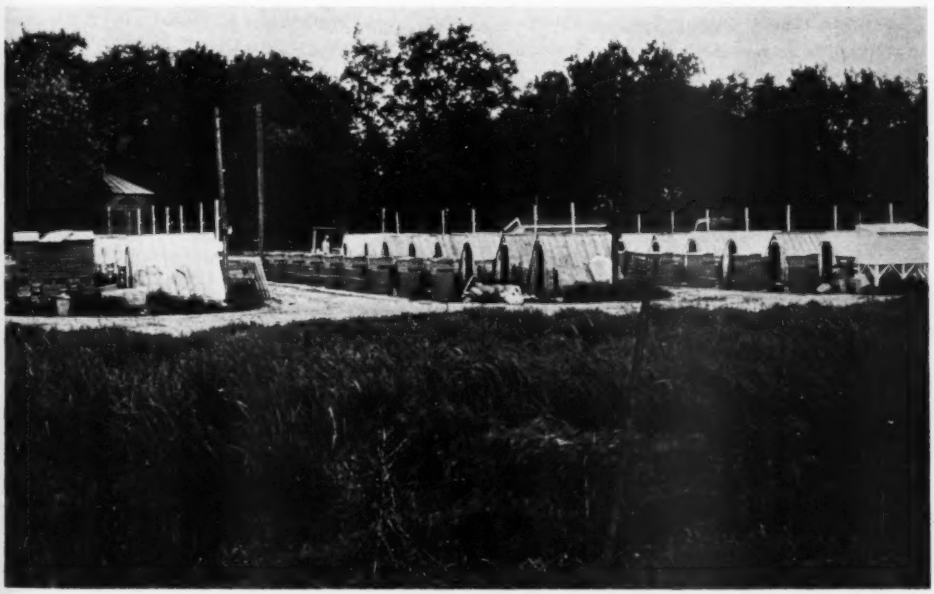
Observations were made on 314 two-month-old Duroc pigs.* One hundred sixty pigs were maintained on concrete platforms. These were randomly allotted by weight outcome groups into five replications of eight experimental treatments, for a total of 20 pigs per treatment. The remaining 154 pigs were divided randomly into the eight treatment groups and placed in 1.5

*Pigs used in this study came from the University of Nebraska Swine Breeding project at the North Platte Experiment Station, a project being carried out in cooperation with the Regional Swine Breeding Laboratory, Agric. Res. Service, U.S.D.A. Hygromycin B used in this study was furnished by the Eli Lilly Company; Parvex was supplied by Upjohn Company; Aureomycin is the registered name for chlortetracycline and was provided by American Cyanamid Company.

acre alfalfa pastures. The experiments were conducted for 76 days, during which time the pigs were weighed biweekly and feed consumption records were kept. The eight treatments were as follows: (1) Untreated controls, (2) hygromycin B alone, (3) hygromycin B + aureomycin,® (4) hygromycin B + repeated treatment with parvex,®[3] (5) aureomycin + repeated treatment with parvex, (6) aureomycin alone, (7) repeated treatment with parvex, (8) repeated treatment with parvex + hygromycin B and aureomycin.

These eight treatments were chosen for the following reasons: Treatment 1, the basal ration alone, was to be a test of the production of Ascaris-infected pigs. Treatment 2, the hygromycin B fortified ration, was considered as a test of the efficacy of hygromycin B as an ascaricide and to show whether rate of gain and feed efficiency were improved. Treatment 3 was devised to test compatability of two antibiotics in the ration, and as an indication of whether any increased performance was due to antibiotic response or to anthelmintic effect. Treatment 4, consisting of hygromycin B with repeated parvex treatments, was included to test whether hygromycin B would enhance the rate of gain and feed efficiency of pigs which had had their worms removed by piperazine action. Treatment 5 was included to test whether aureomycin would produce the same growth response as hygromycin B in worm-free pigs (worms removed by parvex). Treatment 6, aureomycin alone added to the ration, was to determine whether or not the aureomycin growth response would be equal to that of hygromycin B. The pigs repeatedly treated with parvex (lot 7) were included to test how much increased gain was realized by removing adult ascarids and to compare the performance of these pigs with those being treated with hygromycin B. Treatment 8 was included to check the compatability of aureomycin and hygromycin B in pigs which had previously had worms removed by another anthelmintic (parvex).

The study was planned as a 2^3 factorial design, and appropriate statistical methods were applied to the resulting data.



A view of concrete feeding platforms. Each row consists of eight pens and makes up one replication of the trial. A fifth row was located to the left of this picture. Four pigs occupied such lots (closeup opposite page) which measured approximately 10 x 20 ft.

TABLE 1. Composition of the Basal Experimental Ration[1]

Ingredient	Amount (lb.)
Ground yellow corn	80.6
44% solvent soybean oil meal	8.5
60% fishmeal	2.5
50% meat and bone meal	2.5
17% dehydrated alfalfa meal	2.5
Ground limestone	0.5
Steamed bone meal	0.3
Salt (iodized)	0.5
Trace minerals (high zinc, swine)	0.1
Vitamin mix[2]	2.0
	100.0

[1]Hygromycin and aureomycin added at the expense of corn. Levels added were 6,000 units and 5 mg. per lb. of complete ration, respectively.
[2]Contributed the following amounts of vitamins per lb. of complete ration: Vit. D_3, 250 I.U.; riboflavin, 1.7 mg.; calcium pantothenate, 3.4 mg.; niacin, 7.6 mg.; choline chloride, 85 mg. and Vit. B_{12}, 10 mcg. Irradiated dry yeast was provided by Standard Brands, Inc. New York, N. Y. and Merck and Company furnished Merck B_{12} and Merck 58C for this vitamin supplement.

Feces were collected from two pigs in each lot on the concrete platforms and from six pigs in each pasture when the pigs reached three months of age. This long delay was necessary to allow the ascarids ample time to mature and begin producing eggs before egg counts were made. Feces were picked up from the pen floors, using care to obtain as fresh a specimen as possible and to avoid contamination from other lots. Parasite eggs in the feces were again counted when the pigs were four months of age and again 15 days later. Parasite egg per gram (EPG) determinations were made by the Stoll dilution method. If negative samples were found by this method the Stoll direct centrifugation method was used to reveal infections lighter than 400 EPG. The egg slides were carefully examined and all eggs identified so that the efficacy of the treatment against helminths other than *A. suum* could be checked.

The piperazine compound used was betaine of 1-piperazine carbodithioic acid (parvex). Parvex was given at the recommended dosage at the beginning of the experiment and again 54 days later, which was eight days following the first fecal examination and six and 21 days preceding the second and third examination. Hygromycin B was added to the basal ration in a premix (hygromix)® prepared by the Eli Lilly Company. Five pounds of hygromix (12,000,000 units of hygromycin B) were added to each ton of basal ration. This medicated feed was fed (for 60 days) to all of the treated animals receiving hygromycin B. Aureomycin was added to the basal ration at the recommended rate of 5 mg. per pound and fed for 60 days.

The basal ration used in this experiment was formulated by Dr. E. Peo and Dr. D. Hudman, Department of Animal Husbandry, University of Nebraska, and is shown in table 1.

Feces on the concrete slab were observed during the cleaning periods and ascarids were noted and collected. Following the second piperazine treatment on July 16, repeated observations were made of the feces for expelled ascarids. These observations, coupled with egg counts, gave an indication of the level of infection present in the pigs.

Results

Egg counts. The effects of the treatments on Ascaris egg per gram counts are presented in table 2. The counts were reduced to nearly zero in all four lots receiving

TABLE 2. *Ascaris suum* Eggs Per Gram of Feces: An Average of the Entire Experiment

	Concrete Platform							
	Control	Hygro	Aureo Hygro	Hygro Parvex	Aureo Parvex	Aureo	Parvex	Aureo-Hygro Parvex
Sample I*	7,640	3	1	1	1,155	12,040	1,100	1
Sample II	11,383	1	1	1	1	10,118	283**	1
Sample III	5,263	0	0	0	1	3,680	0	0
	Pasture Trial							
Sample I	11,900	0	0	33	1,500	5,066	12,675	0
Sample II	4,466	0	0	2	0	5,600	0	0
Sample III	10,860	8	0	2	0	11,558	0	0

*Lots 4, 5, 7, and 8 were fed parvex 46 days prior to sample I; 6 days prior to sample II; and 21 days prior to sample III. **Resulted from two positive specimens in one lot.

TABLE 3. Daily Gain of Pigs on Each Treatment

Treatments	Control	Hygro	Aureo Hygro	Hygro Parvex	Aureo Parvex	Aureo	Parvex	Aureo-Hygro Parvex
Concrete Trial*								
Number pigs	19	18	19	18	20	18	20	19
Initial wt.	37.7	37.8	37.6	37.5	37.3	37.7	37.6	37.6
Final wt.**	134.9	138.3	151.9	146.3	147.2	148.1	135.9	154.0
Daily gain	1.27	1.37	1.51	1.42	1.45	1.45	1.29	1.52
Feed/lb. gain	3.53	3.26	3.14	3.16	3.29	3.27	3.31	3.16
Pasture Trial								
Number pigs	21	17	21	20	18	17	20	20
Initial wt.	37.7	38.8	40.0	37.7	35.5	37.3	38.1	38.2
Final wt.**	145.5	160.0	159.5	155.8	154.8	156.5	146.4	160.4
Daily gain	1.42	1.59	1.60	1.55	1.52	1.58	1.44	1.61
Feed/lb. gain	2.99	2.90	3.01	2.94	2.99	2.84	3.02	2.91

*Average of pigs in all replications. **76-day experiment.

hygromycin B. The two lots receiving parvex had lower egg counts than the control lots or the aureomycin lots; however, they did not approach zero as did the hygromycin B lots. Forty-six days had elapsed between the initial parvex treatment and the first egg count. This period, no doubt, allowed immature worms which had escaped the effects of the piperazine to develop into egg laying adults. The second parvex treatment brought the egg counts to nearly zero, where they remained until the end of the experiment, 21 days later. Aureomycin had no influence on egg counts. Except for an occasionally observed egg of *Trichuris suis*, only eggs of *A. suum* were found in the fecal specimens.

Worms Recovered. Although care was used in observing the worms expelled it is suspected that some escaped notice. However, those which were recovered supplied important information. Occasional worms were found in each of the untreated lots throughout the entire experiment. Ascarids were found in lot 2 (hygromycin) about one month after the treatment began. Several ascarids were found in the pens after the second treatment of the lots receiving parvex alone and parvex-aureomycin combination. No worms were found in the pens of the pigs after the second treatment of the hygromycin-parvex treated lot. This is taken as evidence that the ascarids in these latter lots had been eliminated by the action of hygromycin B.

Gains in Weight. The gain and feed efficiency of the pigs on the various treatments are presented in table 3. The untreated controls had the lowest daily gain—1.27 lb. on concrete platform and 1.42 lb. in pasture. Pigs which received only parvex were next to the controls, being 0.02 lb. higher in each case. Animals which were fed all three medicaments produced the greatest gain—1.52 lb. on concrete and 1.61 on pasture. These gains were almost identical to those made by the pigs which received hygromycin B plus aureomycin. In the pasture trial the gains of the pigs which received hygromycin B were almost the same as that of the pigs which received all three treatments (1.59 lb. and 1.61 lb. respectively). This was not true on the concrete platform where the hygromycin B treated pigs gained only 1.37 lb. daily as compared to 1.52 lb. for the triple-treated lot.

Statistical Analysis. The average daily gain per pig in each treatment and replication is presented in table 4. As can be seen there was considerable variation from one replication to another; however, it will be noted that those lots fed aureomycin alone generally made greater gains than the other treatments within the replication. Because of this consistently increased gain, an analysis of variance indicated that aureomycin was the only treatment that gave a significantly ($P = 0.01$) increased gain (table 5). In replication five of the pigs that received hygromycin B made the best daily gain, 1.48 lb., table 4. However, this was the only replication where such a response was observed and as a result the added gain in hygromycin B lots only approached significance

($P = .05$). The pigs treated with parvex generally gained somewhat better than the control lots within the same replication but this difference did not approach statistical significance. None of the combinations produced a significant interaction; however, a relatively consistent additive effect resulted when any two of the treatments were applied together. (Table 3.)

Significant differences between the series of means can also be demonstrated by applying Duncan's[5] multiple range test. (Table 4.) After it had been shown that there was a treatment difference, Duncan's test established the smallest difference that can occur between the means before they can be considered significant. The means are tabulated in ascending order and the smallest significant difference is calculated. In the trial on the concrete platforms, pigs fed the triple treatment and those treated with aureomycin plus hygromycin B made significantly greater gains than the control and parvex lots, but not significantly higher than any other lots. In the pasture trial the hygromycin B, hygromycin B plus aureomycin, hygromycin B plus parvex, aureomycin, aureomycin plus parvex, and triple treated pigs had significantly higher daily gains than the control pigs and those treated with parvex. (Table 6.)

Duncan's multiple range test likewise indicated that all of the treatments had significantly ($P = 0.05$) greater feed efficiency than the controls. (Table 7.) Combination of the medicaments resulted in consistently (though not significant at 5% level) more efficient feed utilization. Feed consumption records collected from pigs on pasture do not indicate any treatment differences, probably due to unmeasured forage utilization.

Discussion

The egg counts along with observations of the number of worms expelled following the last parvex treatment indicated that the average worm burden was approximately six ascarids per pig. The parasitized control pigs gained 1.27 and 1.42 lb. daily throughout the trial on concrete and pasture respectively.

Removing this light infection resulted in improved performance. Those pigs treated with parvex did not display greatly increased gains but they were significantly more efficient in feed conversion. (Table 7.) This observation adds evidence to the commonly held theory that ascarids impair the digestive efficiency of the small intestine but that this damage is often masked because the pigs gain at nearly the same rate as worm-free animals; they merely require more feed to produce a pound of gain. The parvex-treated lots had an increased daily gain of only 0.02 lb. above the controls but they made this gain while eating about 0.25 lb. less feed per pound gain than was required by the control pigs. It can readily be seen that this increased feed efficiency paid for the anthelmintic treatment and resulted in additional profit on those pigs receiving treatment over the untreated controls.

In this trial hygromycin B appeared to be an effective ascaricide. Ascarids were abundant in the parvex-treated lots following the second treatment, whereas no worms were found in the pens of those pigs treated with both parvex and hygromycin B following the second parvex treatment. Similar results were obtained by Conrad and Beeson.[6] In their experiments, sodium fluoride expelled 14 worms from the control animals but none from those which were

TABLE 4. The Average Daily Gain Per Pig in Each Lot of Five Replications on Concrete

Treatments / Replications	Control	Hygro	Aureo Hygro	Hygro Parvex	Aureo Parvex	Aureo	Parvex	Aureo Hygro Parvex
1	1.64	1.61	1.78	1.67	1.56	1.55	1.43	1.77
2	1.30	1.34	1.61	1.45	1.55	1.53	1.40	1.48
3	1.33	1.11	1.55	1.57	1.48	1.51	1.44	1.49
4	1.08	1.01	1.45	1.06	1.27	1.25	1.20	1.51
5	.93	1.48	1.24	1.36	1.37	1.45	.99	1.32

TABLE 5. Analysis of Variance of Rate of Gain and Feed Utilization of the Pigs on Concrete

Source of variance	d.f.	Mean squares: Date of gain	Mean squares: Feed efficiency
Replication	4	.2051**	.1550*
A (Hygro)	1	.0639	.2496
B (Aureo)	1	.2755**	.0740
C (Pip)	1	.0096	.0563
AB	1	.0016	.0168
AC	1	.0037	.0336
BC	1	.0185	.0846
ABC	1	.0035	.0009
Reps X treatments	28	.0171	.0570

*p = 0.05; **p = 0.01.

being fed hygromycin B. Better gains resulted from hygromycin B under the pasture conditions than on the concrete platform, 0.17 and 0.10 lb. daily more than the controls respectively.

Hygromycin B and aureomycin were found to be compatable, and combination of the two antibiotics in the ration produced slightly greater gains than when each was applied singly.

Parvex plus aureomycin removed a major portion of the ascarids but the rate of gain was only slightly greater than in the lot receiving aureomycin alone. This is further evidence that added gain depended on more than the elimination of the estimated six ascarids per pig.

The growth stimulation elicited by aureomycin (treatment 6) was nearly equal to that produced by hygromycin B at the existing level of parasitism. However, it should be pointed out that the added advantage of eliminating infective material for future swine on the premises makes hygromycin B more beneficial. Aureomycin produced a greater stimulation of growth on the concrete platform than in pasture.

Parvex successfully eliminated adult worms at the second treatment as indicated by the negative egg counts following treatment. (Table 2.) The first application of parvex apparently failed to expell some immature ascarids since positive, though reduced, egg counts resulted 46 days later. The piperazine compound should have been applied more frequently in order to completely eliminate the ascarids as was desired in this trial. If piperazine compounds are to be used in a control regimen to prevent deposition of eggs they apparently must be applied more often than every two months.

The pigs in lot 2 on concrete consumed an average of 0.6 lb. of hygromix during the 60-day feeding period. Hygromix retails for approximately 50 cents per pound, giving a treatment cost of 30 cents per pig. The pigs on pasture consumed 0.7 lb. of hygromix for a treatment cost of 35 cents per pig. Approximately 10 gm. of parvex were given each pig at the first treatment and 20 gm. each at the second treatment—or 30 gm. in all. In this case the parvex would have cost about 40 cents per treated animal. It is probably advisable to add aureomycin and hygromycin B to the ration of growing pigs since their conbination resulted in higher daily gain and more efficient feed utilization.

In the pasture trial the pigs that received hygromycin B gained an average of 13 lb. each more than the untreated controls. This added production paid for the medicament

TABLE 6. Duncan's Multiple Range Test Applied to the Mean Daily Gain of the Treatments on Concrete Platform and Pasture

	Trial on Concrete Platform							
Treatment	Controls	Parvex	Hygro	Hygro Parvex	Aureo	Aureo Parvex	Hygro Aureo	Hygro-Aureo Parvex
Mean daily gain	*1.27*	*1.29*	1.37	1.42	1.45	1.45	1.51	1.52*
	Trial on Pasture							
Treatment	Controls	Parvex	Aureo Parvex	Hygro Parvex	Aureo	Hygro	Hygro Aureo	Hygro-Aureo Parvex
Mean daily gain	*1.42*	*1.44*	1.52	1.55	1.58	1.59	1.60	1.61

*Any two means not in same type style are significantly different.

TABLE 7. Duncan's Multiple Range Test Applied to the Average Feed/lb. Gain for the Trial on Concrete

Treatment	Controls	Parvex	Aureo Parvex	Aureo	Hygro	Hygro Parvex	Hygro Aureo Parvex	Hygro Aureo
Ave. feed per pound gain	3.53	3.29	3.27	3.27	3.26	3.16	3.16	3.14

and resulted in added profit. The aureomycin medication on concrete was the only other treatment that resulted in significantly added gain (13.2 lb). The combination of parvex and hygromycin B did not result in significantly added gain nor did the former enhance the effect of aureomycin. However, the combination of parvex, or other piperazines, with aureomycin has the advantage of eliminating contamination of the premises with Ascaris eggs, thereby limiting infection of future inhabitants in addition to the antibiotic effect.

Reducing the supply of Ascaris eggs is important because the migratory phase of the ascarid infection produces severe damage. Underdahl and Kelley[7] found that the pathogenicity of virus pneumonia of pigs was increased ten-fold by the migrating Ascaris larvae. The production of Ascaris eggs can be cut off by the application of any ascaricide *e.g.* sodium fluoride, cadmium salts, the piperazines, or hygromycin B; however, these compounds must be applied properly if they are to accomplish their purpose and they will doubtlessly be more effective if their application is combined with planned rotation to clean ground.

Summary

A study evaluating hygromycin B and parvex indicated relative efficiency as ascaricides in swine. Hygromycin B eliminated *A. suum* when fed at the rate of 12,000,000 units per ton of feed for 60 days. Under pasture conditions hygromycin B resulted in 13 lb. added gain per pig at a cost of 35 cents for the treatment.

Parvex effectively removed adult ascarids but apparently some of the immature worms were not expelled when the treatment was first applied to the 37 lb. pigs.

Hygromycin B and aureomycin were found compatible when both were fed in the same ration and when fed in combination produced slightly greater daily gains than when each was applied singly.

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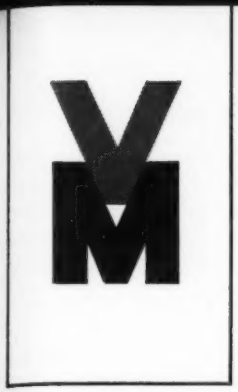
Immunity to Fungus Infection

In a conversation a few days ago the matter of immunity to ringworm (*Tinea tonsurans*) infection was raised. The question was why this and some other fungi do not exert an antigenic action with the formation of antibodies? The answer is, it seems to me, quite simple. These fungi are comparatively superficially lodged that not enough and probably none of the bodies reach the blood stream to stimulate antibody formation with a resulting immunity. This is also the case in poultry or other animals affected with favus. On the other hand, fungoid infections that penetrate the tissues deeply do stimulate or elicit a defense reaction in the host.—*R. R. Dykstra, D.V.M.*



Probably no group of drugs developed during recent years has had the impact on practice that has resulted from wide employment of ataractics. The authors present clinical observations covering one year of experience.

Professional and Therapeutic Rationale of Tranquilizers

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THIS paper presents some observations on the beneficial impact of this class of compounds on our practice and a clinical review of perphenazine (trilafon®, an amino derivative of chlorphenothiazine — Schering Corporation, Bloomfield, N. J.) as a representative tranquilizing agent. Though psychotically disturbed animals are exceptional, the unique action is used to advantage in a surprising variety of practice situations.

Broad Benefits in Routine Practice

Review of the broad clinical benefits of this potent ataractic drug will emphasize its role in improving clinical technics and in enhancing client appreciation of advances in the science and art of veterinary medicine. The industrial city of Moline, Ill., surrounded by a concentrated livestock economy, offers ample opportunity for diversified use of such a drug.

Animal resistance to handling is characteristic, and not likely to change. Aged, toxic, heavily parasitized, undernourished, debilitated, or parturient animals are observed and handled in this practice daily. Many are suffering from infectious conditions and exhibit varying degrees of respiratory or cardiac embarrassment and exhaustion. All too frequently such animals exert themselves to the point of collapse while being restrained for examination or treatment. No veterinarian can relish this situation.

In addition to representing a significant development for efficient and humane restraint, tranquilization offers a new concept of preanesthetic medication. By widening anesthetic safety margins or by obviating the necessity for general anesthesia in some cases, incidence of surgical complications due to anesthetics is reduced.

Control of excited, apprehensive or aggressive animals at hospitals, farms, kennels, or homes is beneficial, and makes a favorable impression. Tranquilizers also alleviate the tremendous physical and mental 'beating' long accepted and endured by the profession as a necessary evil.

Tranquilizers facilitate careful, thorough application of diagnostic tests or examination technics. It is felt that this action facilitates precise interpretation of results

TABLE 1. Perphenazine Restraint In Cattle

Condition	No. Cases	Perphenazine Alone	Perphenazine Plus local	Adequate restraint achieved	Side effects oversedated etc.
Teat surgery	114	95	19	105	3
Rumenotomy	19	....	19	19	0
Caesarean	11	....	11	11	1
Dystocia	78	78	....	75	3
Foot-rot	37	37	....	35	0
Joint surgery	4	4	....	4	1
Dehorning	85	85	....	79	2
Castration	6	6	....	5	0
Total	354	311	49	332	10

and observations. The indicated therapeutic measures can then be given with the least possible imposed stress.

Extensive medical or surgical technics are enhanced by tranquilization in everyday practice. Dental surgery, major and minor surgery, routine medication as well as cosmetic and grooming procedures can be given the exact and detailed professional attention they require.

Mode of Action

Several theories as to the mode of action of these drugs have been proposed. The one confirmed by our clinical experience suggests:

1. Behavioristic effects are due to an alteration or modification of basic consciousness or awareness. The major site of activity is in the mid-brain.

2. These drugs apparently act to alter transmission and integration of nerve impulses from the periphery enroute to one or more higher cortical centers for recognition and response.

3. Most behavioristic activity requires coordination of several centers of the brain, therefore altered transmission of an impulse may reduce or eliminate the expected response.[1]

These hypotheses explain the alert awareness, yet apparent indifference to unusual environment, the reduction of psychomotor activity, the changed response to a threatening situation, and the apparent indifference to minor pain or irritation. All these things are associated with the appearance of a tranquilized animal.

Clinical Observations

We concur with many authors[2,3,4,5] that dosage of tranquilizers is an individual problem and is subject to considerable variation. The necessity for cautious familiarization with these potent new tools of medicine is also recognized.[6]

Horses

Perphenazine is used intravenously in selected cases as a means of restraint in the horse. This species is highly sensitive to the action of the drug, the onset and degree of tranquilization being proportional to route and dosage used. A 1,000 lb. horse will be satisfactorily tranquilized with 20 to 35 mg. Onset of activity is observed to vary from 15 minutes to 1½ hours. Perphenazine is used as a restraint for trimming hoofs, floating teeth, castration, repair of wire cuts, and other types of minor surgery, as well as to quiet colicky animals for medication. Intramuscular doses of 30 to 40 mg. will effect comparable results but onset is delayed somewhat.

In one case effects of overdosage (150 mg.) resembled the convulsive seizures of severe colic. The horse appeared mentally deranged, powerfully resisted restraint, yet had poor coordination of muscular effort. To prevent self mutilation, the animal was cross-tied and chloral hydrate was administered to control unexpected response. This case history is cited so that others might avoid similar difficulties brought on by the assumption that "if a little is good, more is better."

Cattle

In dairy and feedlot cattle practice, use of this drug saves time, eases restraint and permits use of far better surgical technic under usual farm conditions. Adult cattle weighing under 1,200 lb. are adequately tranquilized by an intravenous dose of 75 to 100 mg. or 100 to 125 mg. intramuscularly. For larger cattle, 25 mg. is added for each additional 400 lb. weight. Onset of drug activity is five to ten minutes and lasts about eight hours.

TABLE 2. Perphenazine Restraint in Swine

Condition	No. cases	Perphenazine alone	Perphenazine Plus local	Adequate restraint achieved	Side effects oversedated etc.
Dystocia	39	39	....	36	1
Caesarean	17	....	17	15	1
Viciousness	26	26	....	23	0
Castration	8	8	....	8	1
Repair of hernia	23	23	....	22	1
Total	113	97	17	104	4

An acute respiratory and cardiac crisis is often observed in diphtheria and the pneumonia — shipping fever complex in cattle. Exhaustion occasioned by vigorous physical restraint does not improve prognosis. While tranquilization does not reduce the exertion of initial restraint, animals treated with antibiotics plus tranquilizer quiet down in an hour and exhibit less respiratory distress. In 12 to 24 hours, these animals are generally markedly improved compared to those not receiving tranquilizer.[7]

Perphenazine is routinely used as the sole means of restraint, or if necessary (*e.g.* rumenotomy or cesarean section) with local anesthetic for bovine surgery. Table 1 summarizes bovine clinical use.

Overdosage was occasionally observed early in our use and effort to establish an optimum. Oversedation, extended tranquilization, and recumbency were usual signs noted. Our belief is that, for a few days following major surgery, a cow should be permitted quiet rest and be protected from over exertion. Therefore, slight overdosage is perhaps more beneficial than harmful.

Swine

In swine, we use 0.1 mg. per lb. of body weight intravenously. This dose is optimal for swine up to 450 to 500 lb. We consider 50 mg. a maximal dose in swine, having found it adequate to quiet 800-lb. sows. The most dramatic result noted has been in treating vicious sows that refuse to suckle

TABLE 3. Perphenazine in Dogs

Conditions	No. cases	Perphenazine Alone	Perphenazine Plus local	Perphenazine Plus general	Adequate	Slight effect	Side Effects Excitation	Side Effects Over sedated
A. General								
Treating ears	41	41	....	....	34	4	1	2
Scaling tartar	32	32	....	....	29	1	....	2
Grooming	160	160	....	....	153	5	1	1
Lacerations	23	16	4	3	22	1	....	....
Minor surgery	46	44	2	....	43	3	....	....
Severe pain	15	15	....	....	11	4	....	....
Pruritus	80	64	(28)*	....	78	2	....	....
Vomition	54	54	....	....	51	3	....	....
B. Preanesthesia								
Caesarean	30	....	30	....	29	....	1	....
Spay	82	....	57	25	80	1	1	....
Dental Surgery	14	14	....	....	12	2	....	....
Fracture red.	12	6	....	6	12	....	....	....
Ear trims	22	....	22	....	22	....	....	....
Gen. Surgery	19	....	10	9	19	....	....	....
C. Behavioral Control								
Restlessness, Hyperactivity, Excitability, Nervousness, Apprehension	225	225	....	....	206	16	....	3
Fear	6	6	....	....	5	1	....	....
Hysteria	8	8	....	....	6	1	....	1
Timidity	4	4	....	....	4	....	....	....
Gun-shy	4	4	....	....	3	1	....	....
Carsick	28	28	....	....	22	3	....	3
Noisy	200+	200+	....	....	175+	12	4	6

*Intramuscular prednisone used on 28 dogs in this series.

their litter (postpartum hysteria). In a matter of minutes, these quiet down, make a nest, lay down and permit pigs to suckle. Table 2 outlines clinical experience with perphenazine in swine.

Small Animals

In hospital practice, tranquilization solves several vexing problems and nuisances. By trial and error a parenteral dosage of approximately 0.25 mg. per lb. and an oral dose of 0.4 mg./lb. for routine tranquilization of the mildly excited, noisy or apprehensive dog has proved satisfactory. This dose produces desirable tranquilization for routine office examination, minor surgery, and for bathing or trimming when necessary. This dose is employed as preanesthetic medication prior to local or general anesthesia and for its antiemetic action. Aggressive, vicious or unmanageable dogs are restrained for handling or treatment using up to 1.25 mg./lb. parenterally.

Several hundred dog patients have received perphenazine in our hospital. It has replaced narcotics as preanesthetic medication. It is an excellent antiemetic. As a means of restraint, tranquilization greatly reduces the work load in treating medical patients. It has eliminated restraint problems and reduced labor costs in the bathing, trimming, and grooming department. It has no effect on thirst or appetite. We also observe that boarders, unable to adapt to hospitalization, can be maintained and returned to owners in much better condition when tranquilizers are used. Our limited experience with cats indicates dosage and results are comparable. Small animal uses are tabulated in table 3.

Summary

After more than one year of intensive evaluation of perphenazine it is now believed the tranquilizers are making a long-needed contribution to veterinary practice. These drugs have enabled practitioners to upgrade the quality of veterinary service. Side effects are minimal and may be used to advantage. In this study, no attempt has been made to compare perphenazine with other tranquilizing agents employed. Fullest benefit of the concept of tranquilization is gained by selecting one drug and becoming thoroughly familiar with its use under all possible conditions.

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Training In Veterinary Mycology

A course in Laboratory Diagnostic Methods in Veterinary Mycology will be offered at the Communicable Disease Center, Public Health Service, Chamblee, Ga., Feb. 24-28, 1958.

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Additional information and application forms may be obtained from: Laboratory Training Services, Communicable Disease Center, P. O. Box 185, Chamblee, Ga.

Interest in continuous low-level feeding of phenothiazine has been intense among veterinarians and growers alike since the favorable reports of work in Kentucky with horses. Studies reported here were undertaken to evaluate low-level phenothiazine for cows.

Low-level Phenothiazine Administration in a Cow and Calf Program

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THERE has been considerable interest in low-level phenothiazine administration to cattle in recent years. However, little has been reported on its value in a beef cow and calf program. Turk *et al.*[1] reported that daily doses of 1 gm. of phenothiazine to unweaned beef calves with light parasitic infection did not increase weight gains.

The studies reported here were undertaken to evaluate low-level phenothiazine to the cows, and to the calves during the postweaning period, in a cow and calf program.

Materials and Methods

Experiments were conducted at the experiment station and at a state farm in the area.

The groups receiving phenothiazine were given a mixture (medicated minerals) of approximately 40% minerals (salt and bone meal), 58% cottonseed meal and 2% phenothiazine. This was supplied daily, and often molasses was added in an effort to maintain a daily intake of 2 gm. of phenothiazine. The control group received the mixture without phenothiazine.

Experiment Station Tests. Two comparable pastures were used. One for cattle receiving low-level phenothiazine and one for cattle of the control group. Cows and bulls were 3/4 Hereford and 1/4 Brahman stock. They were put on the pastures in April each year when the calves were 2 to 3½ months of age.

The pastures remained idle during the winter months previous to the tests of 1950 and 1951. Calves of the 1950 and 1951 tests were moved to other pastures for the postweaning period. Calves of 1952 and 1953 remained on the respective pastures during the postweaning period.

During the postweaning period, calves of the medicated group received supplemental feed containing minerals with 2 gm. phenothiazine daily. Control calves received supplemental feed without phenothiazine.

State Farm Tests. The program for the 1953 and 1954 tests were initiated in December 1950. Twenty head of weaned Brahman heifer calves were put on each of four native and four improved pastures.

Selection of two native and two improved pastures for each medicated and control

Technical Article no. 2537. Grateful acknowledgment is made to the Texas Prison System for providing animals and aid in conducting tests at the Darrington State Farm.

group was made in a manner so as to provide comparable conditions for each group in both the native and improved pasture tests. Other than a few changes to equalize groups, each group remained in their respective pastures throughout the experiment. Cows were bred to calve from February to April.

In the summer of 1953 all pastures were divided, and after weaning, the calves were returned to their respective pastures for the postweaning period. During the winter of the postweaning period, all calves received supplemental feed containing minerals. Two grams of phenothiazine daily were added to the feed of the calves of the medicated group. The medicated and non-medicated mineral mixtures were provided after discontinuing winter feeding.

Results

The phenothiazine intake of the cows, calculated on the basis that calves did not consume any of the mineral mixtures, averaged 1 to 1.5 gm. daily per cow. There was no difference in appearance and weight gain in the medicated and control groups of cows. Consumption of the medicated mineral mixture in weaned calves averaged approximately 1 gm. intake of phenothiazine daily.

Experiment Station Tests. The weight gain and egg per gram (EPG) are shown in table 1. The average weight gain of 16 calves of the medicated group and 16 control calves was the same during the preweaning period. During the postweaning period, calves of the medicated group gained more than controls in each of the four years, averaging 34 lb. more than controls, a significant difference.

The average EPG count of the control calves was five times greater than that of the medicated group during the preweaning period, and over three times greater during the postweaning period.

State Farm Tests. In the 1953 tests (table 2) the 57 calves of the medicated groups averaged 15 lb. more at weaning than the 58 calves of the control group. This difference is highly significant. However, during the postweaning period of 190 days, the average gain of the medicated group was only 2 lb. more than that of the control group.

In the 1954 tests (table 3), the 35 calves of the medicated group gained an average of 14 lb. (not significant) more than controls during the preweaning period, and 28 lb. more during the postweaning period of 321 days, a highly significant difference. There was little difference in the average

TABLE 1. Data of Station Calves in Medicated and Control Group.

		PREWEANING						POSTWEANING				
No. calves	Group	Wt. at begin.	Test period Days	Wt. gain	No. counts	Max. EPG	Ave. EPG	Test period Days	Wt. gain	No. counts	Max. EPG	Ave. EPG
1950												
4	Pheno.	201	185	290	7	42	23	184	131	3	14	12
4	Cont.	181	185	300	7	84	59	184	104	3	68	49
1951												
4	Pheno.	144	185	341	5	40	25	157	106	4	91	67
4	Cont.	135	185	356	5	87	55	157	89	4	149	78
1952												
4	Pheno.	162	138	245	7	167	85	126	19	6	93	51
4	Cont.	159	138	225	7	1635	739	126	—10	6	441	211
1953												
2+	Pheno.	212	149	188	6	152	118	211	112	10	208	80
2+	Cont.	180	149	145	6	155	325	211	30	10	582	288
2*	Pheno.	122	186	285	11	98	49	112	—10	4	175	151
2*	Cont.	105	186	320	11	438	123	112	—50	4	1287	639
Average of all calves												
16	Pheno.	169		278			54	197.5	77			61
16	Cont.	154		278			269	197.5	43			200

+January born calves. *April born calves.

TABLE 2. Data of Farm Calves in Medicated and Control Groups.

No. calves	Group	PREWEANING Age in days	Wt. at weaning	Eggs-per-gram No. counts	Ave. EPG	POSTWEANING (190 days) Age in days	Ave. wt.	Gain	Eggs-per gram No. counts	Ave. EPG
1953 NATIVE PASTURE										
Brahman calves										
13	Pheno.	207	345	4	270	397	410	65	4	198
17	Cont.	210	339	4	308	400	388	49	4	128
Brahman-Hereford cross calves										
11	Pheno.	211	420	4	180	401	480	60	4	104
9	Cont.	210	398	4	389	400	482	84	4	244
IMPROVED PASTURE										
Brahman calves										
11	Pheno.	205	405	4	130	395	491	86	4	86
9	Cont.	194	363	4	478	384	436	73	4	228
Brahman-Hereford cross calves										
22	Pheno.	204	429	4	204	394	523	94	4	157
23	Cont.	204	430	4	256	394	528	98	4	163
COMBINED—Calves of Native and Improved Pastures										
Brahman calves										
24	Pheno.	206	372	4	206	396	447	75	4	146
26	Cont.	204	347	4	367	394	404	57	4	162
Brahman-Hereford cross calves										
33	Pheno.	207	426	4	196	397	509	83	4	139
32	Cont.	206	421	4	293	396	515	94	4	186
COMBINED—Native and Improved Pastures and Brahman and Brahman-Hereford Cross calves.										
57	Pheno.	206	403	4	200	396	483	80	4	142
58	Cont.	205	388	4	326	395	466	78	4	175

EPG count of the calves of the medicated group and that of the control group.

Representive calves of the two groups were slaughtered at the end of the postweaning period. Necropsy records (table 3) indicate that the calves of the control group of 1954 had over five times as many worms in the abomasum as calves of the treated group.

Discussion

The purpose of feeding low-level phenothiazine to the cows was to reduce the number of infective larvae on the pasture, thereby reducing the degree of parasitism in the calves.

The cattle did not consume the medicated mineral mixture readily, and it was often

TABLE 3. Data of Farm Calves in Medicated and Control Groups.

No. calves	Treatment	PREWEANING Age in days	Ave. wt.	Eggs-per-gram No. counts	Ave. EPG	POSTWEANING (321 days) Age in days	Ave. wt.	Gain	Eggs-per-gram No. counts	Ave. EPG
1954 Brahman-Hereford cross calves										
NATIVE PASTURE										
18	Pheno.	209	438	3	90					
17	Cont.	209	428	3	80					
IMPROVED PASTURE										
17	Pheno.	202	471	3	45					
18	Cont.	198	451	3	81					
COMBINED — Native and Improved Pasture*										
35	Pheno.	207	454	3	68	528	746	292	5	154
35	Cont.	205	440	3	80	526	704	264	5	206

*All calves were on improved pasture during postweaning period.

AVERAGE NUMBER OF WORMS RECOVERED FROM ABOMASUM

No. calves	Treatment	Trichostrongylus	Ostertagia	Haemonchus	Immature	Total
5	Pheno.	632	1,040	88	32	1,792
6	Control	7,012	2,006	787	206	10,011

necessary to add molasses in order to maintain an intake of over 1 gm. phenothiazine daily.

This method of low-level phenothiazine administration is not considered practical, due to the daily effort involved.

Summary

The effect of low-level phenothiazine administration, in a beef cow and calf program, on weight gain and EPG count of the calves during the preweaning and postweaning period was conducted at two locations. Test involved eight calves in each of four years at the experiment station, and 115 and 70 calves during the two-year period at the local farm.

In the program, as carried out in the tests reported, the administration of low-level phenothiazine resulted in a highly significant weight gain in some groups, while others showed no significance.

The method of administration is not considered practical, due to the daily effort involved.

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Hormone Implants in Pasture Cattle

Table 1. Gains of Grass-fed Cattle Stimulated with Hormone Implants

	Test 1. Control	Test 1. Implanted	Test 2. Control	Test 2. Implanted
No. Cattle	16	16	37	37
Days on test	66	66	72	72
Ave. out-weight	474	499	785	803.8
Ave. in-weight	363	353	641	631.0
Ave. gain	111	146	144	172.8
Gain per head per day	1.69	2.23	2.00	2.40
Added gain per head		35 lb.		28.8 lb.

	Test 3. Control	Test 3. Implants	Test 4. Control	Test 4. Implants
No. Cattle	118	10	132	10
Days on test	190	190	190	190
Ave. out-weight	724	815	956	1033
Ave. in-weight	432	496	701	679
Ave. gain	292	319	255	354
Gain per head per day	1.54	1.68	1.78	2.33
Added gain per head		27 lbs.		99 lbs.

	Test 5. Control	Test 5. Implants
No. Cattle	48	48
Days on test	48	48
Ave. out-weight	819	848
Ave. in-weight	789	796
Ave. gain	30	52
Gain per head per day	.63	1.08
Added gain per head		22 lbs.

Recent developments in the use of hormone implants to stimulate gains in cattle fed on grass have been reported by Dr. R. M. Cerniga, Porterville, Calif. For the past two years Doctor Cerniga has been cooperating with local ranchers to determine whether a combination of 1,000 mg. progesterone and 20 mg. estradiol benzoate in a pellet form would stimulate gains similar to those experienced in trials at commercial feedlots. Results indicate that weight gain advantage is in direct proportion to the quality and quantity of feed available to cattle.

Test results in feedlots have indicated an average gain of 17%, a reduction of feed conversion by 10%, with a maintainance of normal carcass grade and yield. Hormone implants, when used in cattle on grass pasture provide 17% gain, which can amount to 50 lb.; feed conversion can not readily be determined, but implanted cattle appear to be in better health. Implants last 150 days, and cattle can then be re-implanted at the feedlot and still continue to benefit from hormone stimulation.

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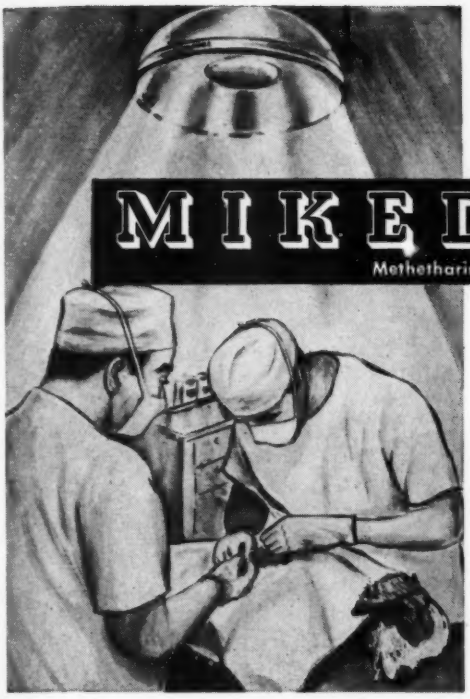

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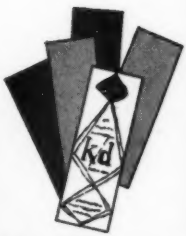

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In a study of 500 Beagles in good health, blood values were consistently higher than those given in the literature as normal. This report was originally presented at the 24th annual meeting of the American Animal Hospital Association, San Francisco, California, May 8-10, 1957, as an interim report of the Atomic Energy Commission, Project No. 4, The Effect of X-Radiation on work Capacity and Longevity of the Dog. Contract AT (11-1) GEN 10, School of Veterinary Medicine, University of California, Davis.

Normal Blood Values in the Beagle

A. C. ANDERSEN, V.M.D., Ph.D., and WILLIAM GEE, B.S.

School of Veterinary Medicine,
University of California
Davis, California

MEAN blood values from 500 Beagles kept under optimum conditions give evidence as presented by Smith[1] that the physiological normal hemoglobin value for the adult male dog is 18 grams per 100 cc. of blood. Reports appearing in the veterinary literature indicate that average blood values in adult dogs are about 6,500,000 erythrocytes and 14 grams hemoglobin. By comparison, the values obtained from dogs in this kennel are 20 to 25% higher.

Materials and Methods

This report includes the results from 2,475 blood samples obtained over a four-year period. Details concerning the care and management of the dogs comprising this kennel have been described in previous reports.[2,3] The dietary regime consisted of 65.7% compounded ration supplemented with vitamins, and 34.3% fresh meat and meat products. Dogs over six months of age were fed *ad libidum* in the morning; puppies, morning and evening. This ration has proved satisfactory, the dogs showing every evidence of general well-being.

Blood samples were taken from the cephalic vein except in young puppies, which were bled by jugular puncture. Hematological technics used throughout this study were similar to those described by Wintrobe.[4]

Discussion

Pre- and Postnatal Blood Values. Hemopoiesis begins in the 21-23-day dog embryo and continues to develop in a manner similar to that in other species. Wintrobe[4] describes the mesoblastic period in human beings as extending to the first quarter of gestation, the hepatic and splenic period reaching a maximum at mid-gestation, and the bone marrow being active at term. In the puppy fetus, the mesoblastic period extends into the second triad of gestation, the hepatic phase begins in the second becoming well-developed by the third, and a rapid transition to marrow hemopoiesis begins shortly before birth. Thus, by comparison, studies of hemopoiesis indicate that the puppy is born about seven to ten days prematurely. For example, active hemo-

poiesis in the spleen does not become evident until term.

The newborn pup has relatively large numbers of erythrocytes and leukocytes (RBC = 5.75 x 10^6; WBC = 16,500). Within a few days cellular components decrease rapidly.

During the nursing period, erythrocytic elements continue to show a progressive decrease in numbers; at the same time, neonatal macrocytosis becomes less apparent. At mid-lactation, a transient state of anemia exists accompanied by a depression in leukocytic elements. This depression is largely due to granulocytic-type cells since absolute numbers of lymphocytes show a progressive rise through the lactation period. Five to seven days before weaning, when puppies are 28 to 30 days of age, all cellular components of blood begin to increase. This is probably due to the small amount of the dam's ration consumed by the puppies.

After weaning, the cellular components of blood continue to increase. As illustrated in graph 1, the decrease in erythrocytes occurring during lactation is followed by a continual increase until the puppy is seven months of age. At this age, erythrocytes are actually greater in number than found in the adult. It is not until the puppy is one year of age that the adult erythrocyte values are approached.

As shown in graph 2, the transient depression in total leukocytes during lactation shows an abrupt increase in numbers after weaning. The greatest number of leukocytes (17,858 mm.^{3}) occurs at two months, but highest absolute values do not occur until the puppy reaches three months of age. This moderate increase in leukocytes is followed by a transient decrease so that by the time the puppy reaches the age of six months adult leukocytic values are reached.

Nine hundred thirty-four blood samples taken from female Beagles (graph 1), and 70 samples taken from male Beagles indicate that sex differences are not discernable during the first year of life.

TABLE 1

BLOOD VALUES — IMMATURE vs. MATURE*

	IMMATURE		MATURE	
	male	female	male	female
LEUKOCYTES	14,047	13,344	12,955	15,069
heterophil	8,050	7,231	7,363	9,371
band	146	110	57	85
lymphocyte	5,558	5,760	3,770	4,135
monocyte	260	210	698	755
eosinophil	33	33	1,067	723
basophil**				
ERYTHROCYTES (10^6)	7.09	7.24	8.39	7.75
PCV	42.3	41.9	50.3	46.6
Hgb (Cmh Method)	13.8	13.9	18.6	16.5
SED. RATE (corrected)	11.7	5.4	1.0	3.7
PLATELETS (10^3)	252	306	407	486
MCV	59.66	57.87	59.95	60.13
MCH	19.46	19.20	22.17	21.29
MCHC (%)	32.62	33.17	36.98	35.41
Number of Dogs	6	6	11	11
Number of Samples	36	36	170	171
Average age (months)	6	6	44	51
Body weight (lbs)	13.4	13.3	33.5	24.1
Rectal temperature (°F.)	102.8	101.2	100.4	100.3

*Diurnal Samples **Basophil $< 0.5\%$ All females in anestrus

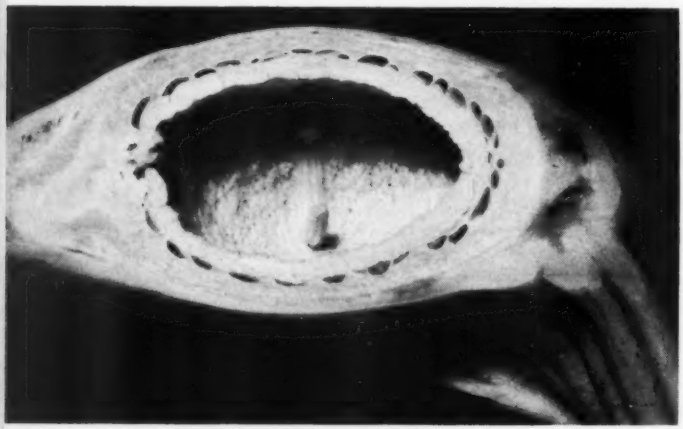


Fig. 1. Dog embryo in utero—23 days, 5 mm. in length. At this time, (2nd trimester of gestation) hemopoiesis begins extraembryonically. (6X.)

Of interest is the increased sedimentation rate when permanent teeth are erupting; the molars and incisors at four months, and the canine teeth at seven months.

Blood Values—Maturity. The Beagle is fully mature at three years of age.[2,5] As mentioned previously, adult blood values are reached at one year of age. Thus, Beagles between one and four years of age were used in this study. The average blood values from several hundred samples from these Beagles were as follows:

	Male	*Female*
Erythrocytes (10^6)	8.31	7.82
Packed cell volume	50.8	48.5
Hemoglobin (Cmh)	18.2	16.7
Sedimentation rate	0.2	1.3
Leukocytes	12,068	12,942
heterophils	7,387	8,232
bands	39	30
lymphocytes	3,286	3,515
monocytes	913	569
eosinophils	443	596

It has been demonstrated that blood samples taken from any major vessel compare favorably when the dog is at rest,[6] and that blood values in active dogs show widespread fluctuation.[7] These variations should be taken into consideration when hematological determinations are being used to detect an abnormal syndrome. Yet few studies have been conducted in the mature dog to illustrate variants that might be expected from such factors as age, sex, and environment.

When hemoglobin values in the male approached 18 grams per 100 cc. of blood, not only were sex differences detectable, but clinical syndromes were minimized. The latter has been especially noticeable in this kennel during the past six years. Dermatotic lesions, enteric disturbances, and respiratory infections have not been a major problem. Consequently, elaborate therapeutic measures have not been required, although continued maintenance of large numbers of dogs are involved.

Reports describing lower normal erythrocyte values than found in this study stated that sex differences were not detectable.[7,8,9]

Diurnal Studies. Over a period of three years, five diurnal trials were conducted. Each trial represented sampling at 1, 2, and 4-hour intervals throughout a 24-hour period. These trials revealed a similar di-

GRAPH 1

ERYTHROCYTIC ELEMENTS

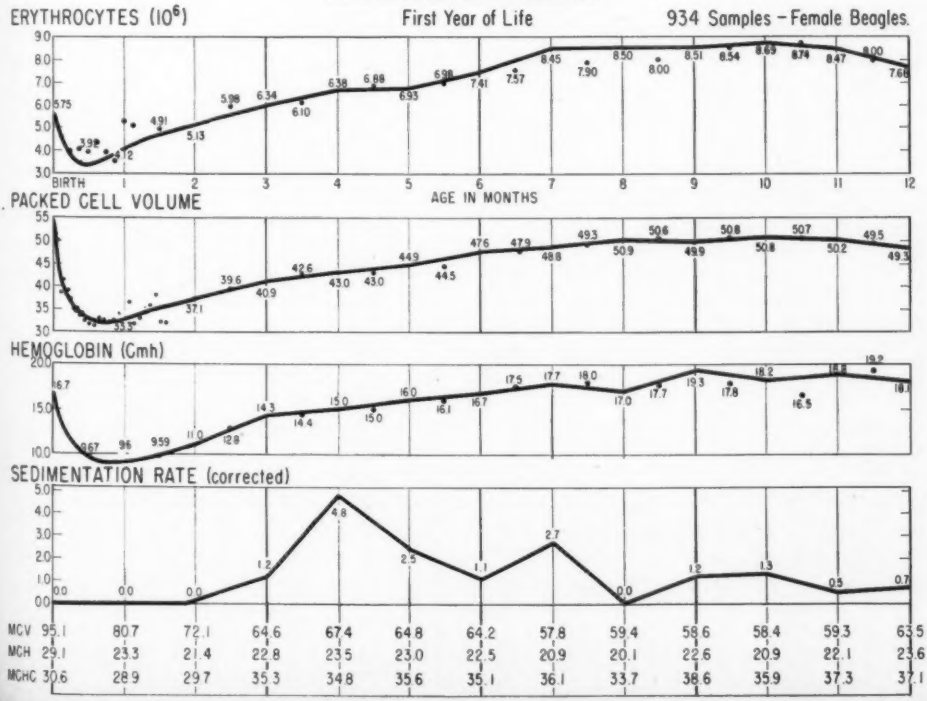

ERYTHROCYTES (10^6)
First Year of Life
934 Samples – Female Beagles
BIRTH
AGE IN MONTHS
PACKED CELL VOLUME
HEMOGLOBIN (Cmh)
SEDIMENTATION RATE (corrected)
MCV 95.1 80.7 72.1 64.6 67.4 64.8 64.2 57.8 59.4 58.6 58.4 59.3 63.5
MCH 29.1 23.3 21.4 22.8 23.5 23.0 22.5 20.9 20.1 22.6 20.9 22.1 23.6
MCHC 30.6 28.9 29.7 35.3 34.8 35.6 35.1 36.1 33.7 38.6 35.9 37.3 37.1

TABLE 2. Peripheral Blood Values During Gestation and Lactation

Weeks	Gestation 2	4	6	8	Term 0	2	4	Lactation 6
Erythrocytes (1×10^6/mm.^{3})	8.85	7.48	6.73	6.26	4.53	5.13	5.65	6.15
PCV (mm.)	53	47	44	37	32	34	38	42
Hgb. (Cmh) gm. per 100 cc.	19.6	16.4	14.7	13.8	11.0	11.7	12.8	13.4
Sed. Rate	0.6	11	31	14.0	12.0	14	14	13
Leukocytes (1.0×10^3/mm.^{3})	12.0	12.2	15.7	19.0	18.9	16.9	17.1	15.9

urnal pattern in the dog as reported in other species.[10,11] During mid-day and early morning hours the number of erythrocytes decreased 1/2 to 3/4 of a million while the leukocytes increased 1 to 2,000 in mature dogs. Similar results were found in immature dogs, but less hourly fluctuation was noted.

Mean values from diurnal studies also offer evidence that sex differences occur. As shown in table 1, male dogs have a 500,000 higher erythrocyte count than females. Correspondingly, packed cell volume and hemoglobin values are higher in the male. It is only in the immature dog that sex differences in blood values are not discernable.

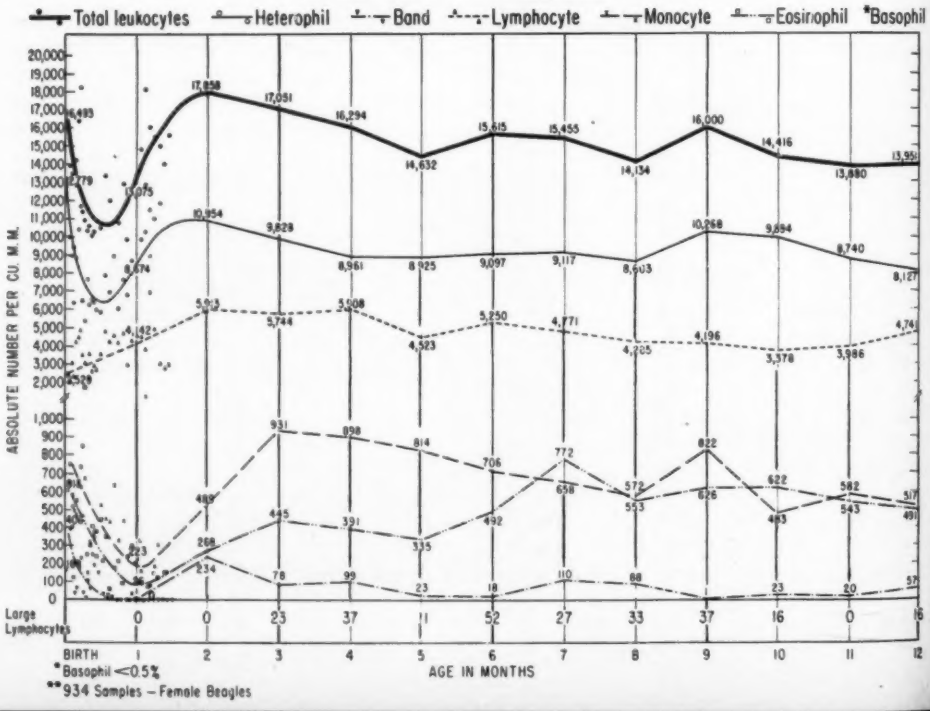
Reproduction. Blood samples obtained from females in metaestrum invariably show increased sedimentation rates from 5 to 15 mm. However, dramatic changes in peripheral blood values follow the advent of pregnancy. As shown in table 2, the later stages of pregnancy cause pronounced decrease in erythrocytic elements with corresponding increase in the number of leukocytes. During lactation recovery is apparent in the cellular elements of blood, but complete recovery is not attained until the litter is weaned.

A 20% decrease in erythrocytic elements have been observed in stud dogs used on alternate days over a period of one or two months, whereas dogs used for one to two matings per week do not reveal this difference.

Continued on page 156

GRAPH 2

LEUKOCYTES – First Year of Life**



In this report of ringworm (athelete's foot) infection in a dog, presumptive evidence is presented of the transmissibility of this common infection. This is the first authenticated case recorded in the United States, and is the second confirmed report that this dermatophyte has produced ringworm in a dog.

Ringworm in a Dog Caused by Trichophyton Rubrum

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THE dermatophyte *Trichophyton rubrum (T. purpureum)* is a common cause of ringworm of the feet (athlete's foot) and nails of man. This fungus, as a rule, produces a chronic type of infection resistant to treatment.[1] There are indications that in recent years human infections with this agent have been increasing both in this country and other parts of the world.[2-7] The reasons for this trend are not too well understood and have been the subject of considerable speculation. There is no evidence, however, that lower animals are involved in the epidemiology of this disease or speculation that they might be playing an unsuspected role as reservoirs of infection. *T. rubrum* infections in animals apparently are rare. Chakraborty *et al.*[8] in 1954 reported the isolation of this fungus from skin lesions on various parts of the body of one dog and two cows at the Bengal Veterinary College, Calcutta, India. The cultures recovered by these investigators were subsequently studied at the Mycology Laboratory of the Communicable Disease Center and confirmed *T. rubrum*. This is the first authenticated record of the isolation of *T. rubrum* from lower animals. A more recent report[9] describes two cases of ringworm in dogs in this country caused by *T. rubrum*. The cultures recovered from both dogs were also studied at the Mycology Laboratory of the Communicable Disease Center and found to be red-pigmented strains of *T. mentagrophytes*. This latter identification was based upon accepted morphologic and newly developed physiologic criteria.[10]

The present report describes a case of ringworm in a dog caused by *T. rubrum*. This is the first such authenticated infection to be reported from a lower animal in the United States and is the second time the disease has been recorded from a dog.

Case History

On March 21, 1957, a one-year-old male Boxer was presented to one of the authors (R.H.G.) for diagnosis and treatment of a skin lesion. At this time, the dog exhibited a single, raised erythematous plaque, ap-

Fig. 1. Lesion on leg of dog caused by *Trichophyton rubrum*, appearing as a dry, scaly patch of alopecia.

proximately two centimeters in diameter, on the medial surface of the left hind leg, two inches above the tuber calcis. The owner stated that the lesion first appeared two weeks previously and showed no tendency toward spontaneous healing. The attending veterinarian collected hairs and skin scrapings from the affected area and submitted these materials to the Mycology Laboratory, Communicable Disease Center, Chamblee, Ga., for mycologic examination. The laboratory diagnosis was ringworm due to *T. rubrum*. The veterinarian prescribed the daily application of a proprietary fungicidal preparation to the affected area. By April 6, 1957, the swelling and hyperemia had subsided, and the lesion presented a dry, scaly appearance with loss of hair (fig. 1.) At this time, a second specimen was collected and submitted to the laboratory. *T. rubrum* was again isolated. The course of the infection was subsequently followed for a period of three months. By June 21, 1957, the lesion had healed, leaving a pigmented, circular area of alopecia. The skin at the site of the infection was smooth and showed no evidence of scar formation or thickening. No new lesions developed during the three month period.

The owner of the dog, a 35-year-old male, resident of Wichita, Kans., had a mild case of "athlete's foot" of several years duration. Periodically he attempted to treat himself with proprietary fungicidal medications without effecting a complete clinical cure. This individual had the habit of rubbing the dog with his bare feet during the evening. Since *T. rubrum* had been recovered from the dog, skin scrapings were collected from the soles and between the toes of the owner's feet and submitted for mycologic study. At the time these materials were collected, the soles of the feet had a dry, scaly appearance.

Mycologic Findings

At the laboratory, examination under the microscope of the specimens submitted from both the owner and his dog was carried out in 10% potassium hydroxide mounts. In all cases, within the skin scrapings, branched, septate, mycelium was observed (fig. 2.)

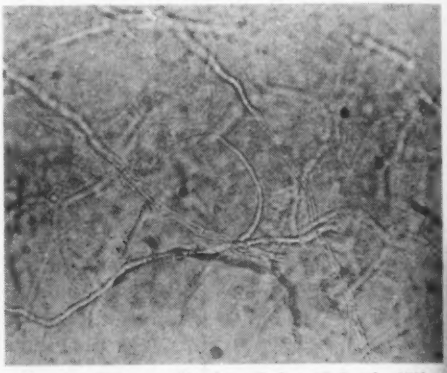


Fig. 2. Skin scraping from lesion of dog in 10% KOH, showing presence of branched, septate mycelium. (X475.)

Fungus elements were not noted in the canine hair, however, nor did the hair fluoresce under the Wood's light.

To isolate and identify the dermatophyte causing the infections in both the owner and his pet, all specimens were cultured on a special selective isolation medium[11], containing the antibiotics cycloheximide,* penicillin, and streptomycin. On this medium the same fungus species was isolated from the human and animal specimens. The colonies were rather slow growing, reaching a diameter of one centimeter in eight days. Grossly, the colonies were flat with a white, fluffy surface. (Fig. 3,A.) The reverse side showed a reddish-purple pigment. (Fig. 3,B.) Under the microscope, delicate, elongate microconidia borne singly along the

*Acti-dione, Upjohn Co., Kalamazoo, Mich.

sides of the mycelium were noted. (Fig. 3,C.) Culture transplants grown on heart infusion tryptose agar** developed numerous macroconidia which were smooth, thin-walled and elongate. (Fig. 3,D.) Colonies grown on cornmeal dextrose agar developed a reddish pigment on the reverse wide. *In vitro* hair cultures[10] for differentiating aberrant isolates of *T. rubrum* and *T. mentagrophytes* were prepared. The hair filaments were not perforated by the isolates after one month of growth. On the basis of these morphologic and physiologic criteria, the fungi isolated from both man and dog were identified as *T. rubrum*.

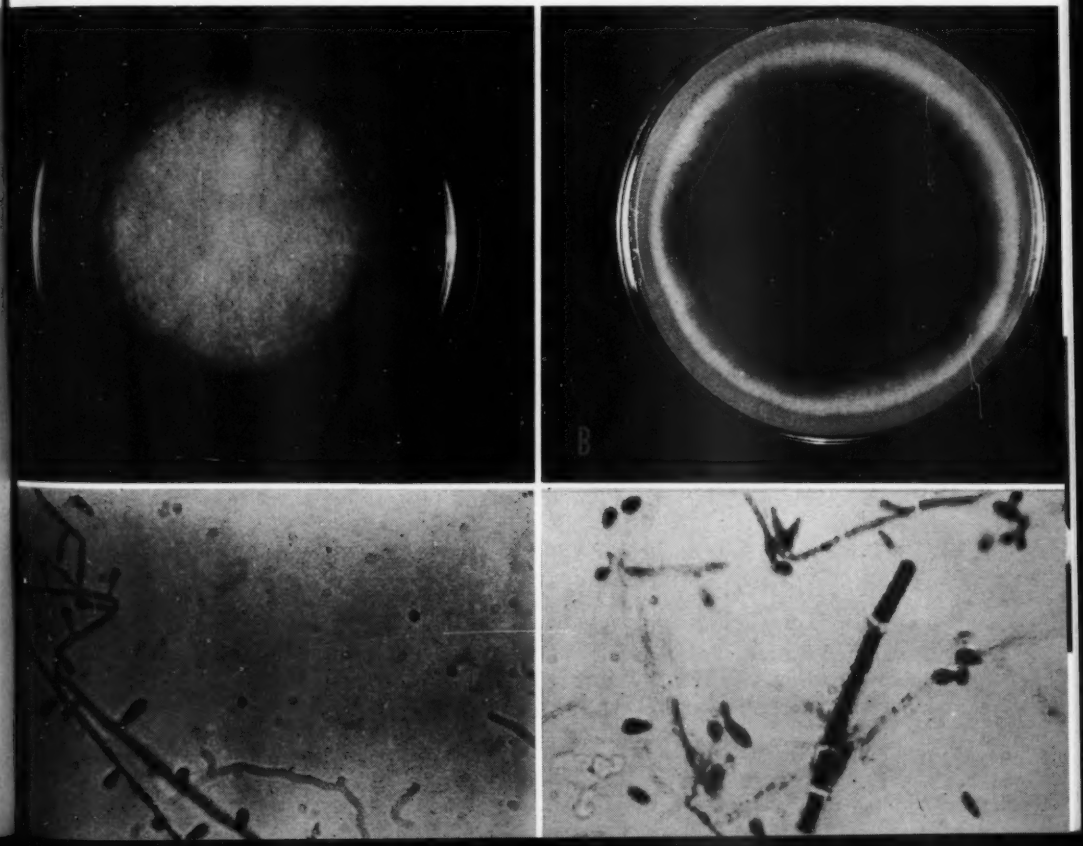
Discussion

Although *T. rubrum* is generally considered to be an anthropophilic dermatophyte, it is apparent that lower animal infections with this agent can occur. In the present case, there is presumptive evidence that the infection was transmitted by the owner to the dog. This possibility is suggested by the fact that the owner had tinea pedis caused by *T. rubrum* and that he had the habit of frequently rubbing the animal with his bare feet. It is of course also possible that the dog contracted the disease as a result of exposure to another source of infection, either human or animal.

In general, the anthropophilic dermatophytes have shown a greater degree of host-specificity than the animal ringworm fungi. Most members of the latter group have the ability to parasitize a diversity of lower animals as well as man. In contrast, the human pathogens have rarely been identified with disease in aberrant hosts. These observations may reflect to a certain extent the more extensive cultural studies of human dermatophytoses. In recent years there has

**Difco blood agar base.

Fig. 3. (A) *Trichophyton rubrum* culture on Sabouraud dextrose agar, presenting a flat, white, fluffy surface; (B) Reverse side of colony, showing a deep reddish-purple pigment; (C) Microscopic appearance of colony cultivated on Sabouraud dextrose agar, showing microconidia borne along the sides of mycelium, (X1200); (D) Microscopic appearance of colony cultivated on heart infusion tryptose agar, showing a smooth, thin-walled, elongate macroconidium, (X1200)



been a marked increase in interest in animal ringworm and several reports have appeared in the literature describing spontaneous lower animal infections with agents generally considered to be obligate human parasites. Since 1951, *Microsporum audouinii*,† the usual cause of epidemic ringworm of the scalp of school children in this country, has been isolated five times from lower animals.[12,13,14,15,16] Likewise, *T. rubrum* has only recently been associated with disease in lower animals. To date, such unusual cases have been too few to be of more than academic interest. However, they do point to the possibility that more extensive cultural studies of animal dermatophytoses may alter our present day concepts of the host-specificity of the anthropophilic fungi.

Summary

A case of ringworm in a one-year-old Boxer caused by *T. rubrum* is described. The owner of this pet was shown to have tinea pedis caused by the same dermatophyte.

This is the first authenticated case of *T. rubrum* infection in a lower animal to be recorded in the United States, and is the second time the dermatophyte has been found to produce ringworm in a dog.

†This spelling is in accordance with the 1950 International Rules of Botanical Nomenclature.

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Cyclopropane: Anesthesia of Choice in Shock

During his presentation at the Annual Conference for Veterinarians at the University of Pennsylvania on January 8, 1957, Dr. Jack O. Knowles stated that barbituates were not anesthetics of choice for patients in shock. If an anesthetic must be given, cyclopropane is probably best. The latter stimulates heart muscles. If a dog is already under barbital anesthesia and begins to exhibit signs of shock, or if a situation develops in which shock may be anticipated, it is preferred to lighten anesthesia. "The only danger of light anesthesia is the danger of spasm, and of course, in the presence of shock, spasm is almost impossible. By lessening the anesthetic, the patient is permitted to bring into play its normal defence mechanisms to protect itself against shock."

Experiments and clinical data are presented here to indicate the usefulness of an enzyme complex in the management of certain inflammatory diseases. This report was presented at the 28th annual meeting of the Florida State Veterinary Medical Association, Clearwater, October 13-15, 1957.

Parenteral Enzyme Therapy with Streptokinase —Human Plasminogen—Streptodornase

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SUCCESS in the clinical management of many difficult medical and surgical problems in man has been reported following parenteral therapy with such enzymes as chymotrypsin,[1] streptokinase,[2,3] and trypsin.[4,5] The rapidly growing list of conditions reported to be responsive to this type of therapy includes: Abscesses, blood clots, boils, bronchitis, bronchiectasis, bursitis, diabetic cellulitis, hematomas, indolent ulcers, certain ocular diseases, pleuritis, sinusitis, thrombophlebitis, thrombosis and trauma. Tillett's[6] discovery, reported in 1933, that a kinase produced by streptococcal cultures was capable of bringing about the lysing of human fibrin clots, provided the lead for the development of parenteral enzyme therapy. This paper is limited to a discussion of the streptokinase (SK) — human plasminogen (HP) — streptodornase (SD) enzyme complex, available commercially as varizyme®.

®American Cyanamid Company, New York, N. Y.

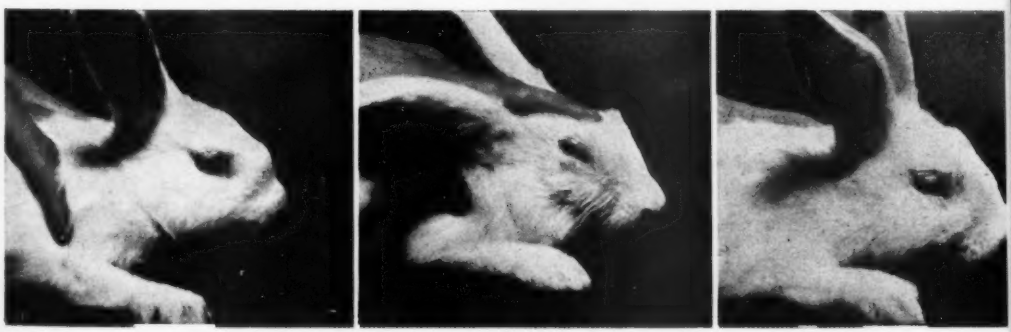

Fig. 1-3. Left—normal rabbit; center—two hours after instillation of solution of mustard oil into the conjunctival sac; right—rabbit treated prophylactically with streptokinase after mustard oil challenge.

Figure 4.

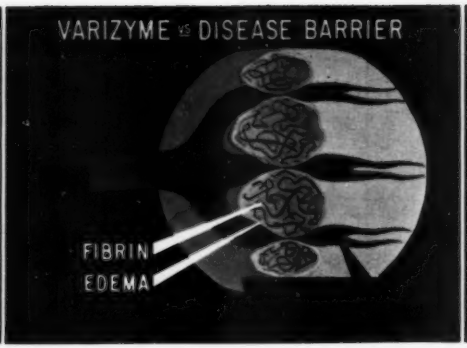

Figure 5.

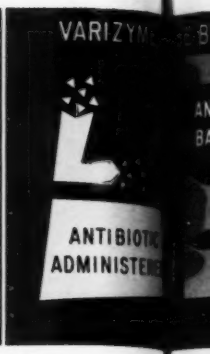

Figure 6.

Concept of Action

A biochemical rationale for the parenteral use of SK-HP-SD in animals has been presented in the literature.[7] Enzymes have long been thought of only in terms of their digestive properties. In human plasma, however, streptokinase reacts with the enzyme precursor, plasminogen, resulting in the formation of the active proteolytic (fibrinolytic) enzyme, plasmin. Streptokinase therefore, brings about lysing of clotted blood and caseous and fibrinous exudates. Edema and inflammatory fluids contain large amounts of fibrin which participates in the "walling-off" process. This process may also prevent humoral or chemotherapeutic agents from reaching and neutralizing the irritant. The lysing effect of SK results in a reversal of inflammation permitting humoral mechanisms and antibiotics to clear up associated infection.

It has not been possible by *in vitro* methods to demonstrate that SK stimulates the plasminogen to plasmin reaction in bovine plasma.[8] Canine and equine plasma do show *in vitro* activity, but to a lesser and more variable degree, than human plasma. When human plasminogen is combined with streptokinase, an additional substance termed "activator"[8,9] is formed. Activator apparently possesses the property of stimulating the plasminogen to plasmin response irrespective of species of animal plasminogen to which it is added. In the absence of a clinically practical test to determine the extent to which plasminogen is activated by streptokinase in the blood of any particular animal, the combining of human plasminogen with streptokinase guarantees and potentiates the reaction.

Streptodornase acts by depolymerizing desoxyribonuclear proteins reducing the viscosity of purulent exudates thereby contributing to the action of the streptokinase-human plasminogen-streptodornase complex when such exudates are present.

Mechanism of Action

The color plates (fig. 4-8) are an attempt to interpret diagramatically the concept of action of parenterally administered SK-HP-SD in the treatment of inflammatory disease. Figure 4 represents normal tissue with its normal blood supply and healthy color. According to concepts advanced by Dubos,[10] Menkin,[11] and others, irritation of tissue, whether mechanical, chemical, or biological in nature, results in the formation of an inflammatory or disease barrier. (Fig. 5.) Damaged tissue cells release an indefinite substance which initiates a chain reaction. The capillaries dilate and become more permeable, allowing fluids to pass freely into the tissues. Neutrophils and later mononuclear cells infiltrate the area. Fibrin is formed through the action of thrombin (liberated from disintegrating blood platlets) upon fibrinogen. This fibrin barrier is remarkably selective in its permeability. (Fig. 6.) Globulin (antibody), bacterial toxins, antibiotics, or bacteria may not pass this barrier although neutrophils pass it readily. Local circulation is impaired by the formation of fibrinous thrombi in the

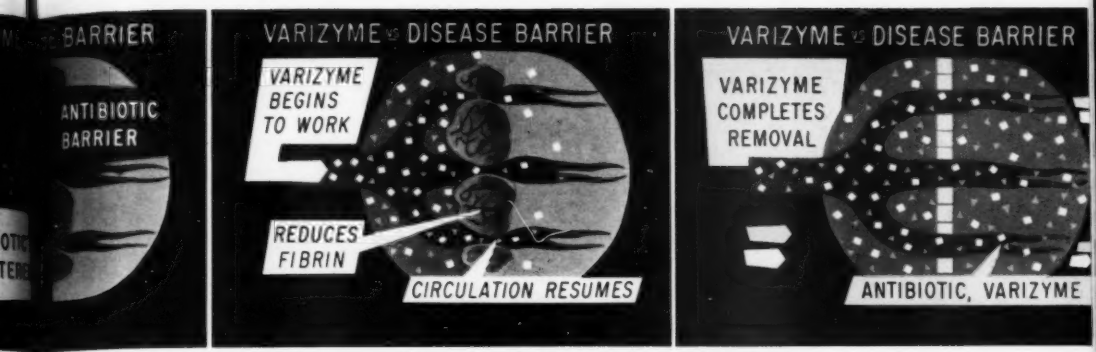

Figure 7.

Figure 8.

arterioles, capillaries and lymphatics and by vascular compression from edema. Anoxia and eventual death of tissue results. If the process continues without interuption, pus is formed through deposition of necrotic material derived from bacteria, leucocytes, and blood. Finally, a wall of fibroblasts forms around the involved area and an abscess results. Streptokinase-human plasminogen by activating plasminogen to plasmin is believed to lyse the fibrinous thrombi in the arterioles, capillaries, and lymphatics as well as the fibrin in the associated edema, thus helping to restore normal circulation. (Fig. 7.) Improved circulation is followed by increased oxidation and further amelioration of edema. When the inflammatory, or disease barrier is lessened or removed, phagocytes and other humoral mechanisms and chemotherapeutic agents can reach the irritant in greater concentration and act more effectively. (Fig. 8.) Simultaneously, the viscosity of purulent exudates is reduced by the action of streptodornase.

Experimental Support for the Theory

A number of animal experiments have been conducted which add support to the present concept of parenteral enzyme therapy. Gordon and Ablondi[12] reported a study conducted on the influence of streptococcal enzymes upon experimental ocular inflammation in rabbits. Two hours after the instillation of a solution of mustard oil into the conjunctival sac of the eye of a normal rabbit (fig. 1) there was a marked edema and inflammation of the nictitating membrane and periorbital structures. (Fig. 2.) The eye of a rabbit treated prophylactically with streptokinase, however, appeared normal two hours following mustard oil challenge. (Fig. 3.) The inflammatory response had been inhibited. The effect of streptokinase administered therapeutically is shown in figure 9. Marked reduction of edema and inflammation was evident four hours post-treatment. (Fig. 10.) By comparison, figure 11 illustrates an untreated rabbit's eye six hours after mustard oil challenge.

Two other significant studies have been reported by Sherry *et al.* [13,14] In the first experiment blood clots were produced surgically in the femoral arteries of a group of dogs. In two of ten control animals clots disappeared spontaneously whereas in dogs treated with large doses of streptokinase alone (300,000 to 400,000 units — two to 12 doses) or small doses of SK-HP (25,000 units) 50% of the clots had disappeared when observed on the sixth day. (Table 1.) Sherry stated also that many of the clots remaining in the SK and SK-HP treated dogs were soft when compared to clots remaining in the control dogs.

Table 1. Effect of Streptokinase and Varizyme on Performed Clots*

Agent Used	No. clots	No. dissolved	% dissolved
Controls	29	3	10
SK alone (large doses)	26	13	50
SK + HP (small doses)	28	14	50

*Sherry (condensed), 5th Ann. Sym. on Blood. Wayne Univ. 1956.

Fig. 9-11. Left—Effect of streptokinase administered therapeutically; center—four hours post-treatment; right—untreated rabbit four hours after mustard oil challenge.

In the second study, (table 2) a traumatic hemorrhagic fibrinous peritonitis was produced in 63 dogs by scarifying 2 x 2 in. areas of the peritoneal wall with a vegetable grater. Twenty three of 23 control dogs showed dense to moderate adhesions when observed on the 12th day. Only 15 of 32 dogs treated with massive doses of streptokinase alone developed adhesions (10 dense; 5 moderate). None of the eight dogs treated with small doses of SK-HP exhibited dense adhesions, although six of these developed moderate adhesions. A comparable experiment conducted in calves yielded similar but less clear cut results.[15]

Clinical Considerations

In animals, SK-HP-SD has been reported to be of value in the management of edema and cellulitis of the udder[16] chronic bovine footrot,[17] pyelonephritis,[18] chronic pyogenic dermatitis,[19] hematoma, pleuritis, and chronic pneumonia[20] and a number of difficult equine problems including bursitis, myositis, septic arthritis, and non-healing wounds.[21] Recently the writer has used SK-HP-SD combined with antibiotics in the treatment of such conditions as abscess, actinomycosis, salpingitis, adhesions of the reproductive tract, stall bruise, chronic pneumonia, pleuritis, and acute mastitis. The clinical results indicate an advantage over antibiotics alone in many difficult cases. It must be stated that all cases have not responded dramatically to this treatment and that failures have been observed. Possibly a shortening of the convalescent period in animals treated simultaneously with antibiotics and SK-HP-SD may prove to be the most important value of SK-HP-SD therapy.

Antibiotic therapy is recommended whenever SK-HP-SD is administered. This is necessary because the enzyme is not itself bactericidal, although many of the conditions in which it is employed are of bacterial origin. SK-HP-SD is also capable of liberating latent infection should it exist at some other than the site of clinical importance. SK-HP-SD may be administered intramuscularly or intravenously. Intravenous route is preferred in order to avoid the local tissue response which may follow intramuscular injection. Although streptokinase does not attack living cells, SK-HP-SD contains a number of antigens which may account for the local tissue reactions which occasionally follows its intramuscular use. Anaphylactoid reactions appear to be of minor clinical significance except in the Thoroughbred horse when treated by the intramuscular route. A number of animals have been retreated with SK-HP-SD weeks

TABLE 2. Effect of Streptokinase and Varizyme on Prevention of Post-operative Adhesions*

Animals	No. dogs	No. with dense adhesions	No. with moderate adhesions	No. with no adhesions
Controls	23	19	4	0
SK alone (large doses)	32	10	5	17
SK + HP (small doses)	8	0	6	2

*Sherry *et al.*, (condensed), Proc. Soc. Expt. Biol. Med., 90:4, 1955.

or months after initial therapy with no indication of developing hypersensitivity. It may also be employed clinically for its local lytic activity.[29-31]

Summary

The concept of parenteral therapy with the streptokinase-human plasminogen-streptodornase (SK-HP-SD) enzyme complex is reviewed. It is suggested that its action is largely dependent upon its ability to stimulate the plasminogen to plasmin reaction in the blood of patients.

Experiments and clinical data appear to support the suggestion that SK-HP-SD, when combined with antibiotics, can be highly useful in the management of certain inflammatory diseases in veterinary practice.

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TE$T Y-O-U-R TAX I. Q.

Q. Your daughter, who was hospitalized for several weeks in the earlier part of 1957, was married in November. If she files a joint return with her husband, have you lost her as a deduction?

A. You gained a son-in-law but lost a $600. dependency exemption for 1957 when your daughter married in November. All is not lost, however. If you provided more than one-half of your daughter's support during the year, you may claim her medical expenses as a deduction on your return.

Q. You filled very few inside straights during the past few months and lost approximately $300. to the members of your Thursday night poker club. Can you deduct the loss?

A. Watching television can be most relaxing and it might even help you to forget your poker losses — which is the thing to do because net gambling losses are definitely not deductible. Net gambling gains are taxable as income; so if you won money in a football pool or other sources, you may use your poker losses to offset these gains.

Q. Last March your car skidded on a wet road and grazed a telephone pole. The damage was not covered by insurance and it cost you $100. to have the car repaired. How much casualty loss can you take?

A. The I.R.S. has ruled that "if the repairs do nothing more than restore the property to its condition immediately before the casualty and do not add to (its) value, utility or useful life, such repair costs may be used as a measure of the value of the destroyed portion." Where you were going at the time of the accident does not affect the deductibility of car damages.

Q. While playing hide-and-seek in your backyard, the neighbor's children trampled and killed several of your more expensive bushes. Is the cost of replacing this shrubbery deductible as a casualty loss.

A. Damage to your shrubbery caused by children, dogs or errant lawnmowers is not deductible. If your home or lawn is damaged by fire, storm or flood the loss not covered by insurance may be deducted. When large amounts are involved it is wise to have an expert appraisal made immediately after the casualty.

Q. Your 16-year-old son works during the summer for you in your unincorporated practice, and you pay him a weekly salary. Since he is a full-time employee, does he come under social security.

A. Since your son works for you, you are not supposed to pay social security tax on his wages, nor is he required to make contributions. If your business is incorporated, however, the corporation must pay social security tax on his salary.

Q. Last year you gave your church a small piece of property for which you had paid $500. some time ago. Its value at the time of the gift was $1,500. As a result, can you deduct the appreciated amount?

A. Your deduction for a charitable contribution is the value of the gift at the time it is made. You are not considered to have realized a taxable gain or deductible loss when you give property away. You may claim a deduction for the entire $1,500. so long as this amount does not exceed 20% (30% in some cases) of your adjusted gross income.

Q. There were a few leaks in the shingle roof of your office building; so you constructed a new tile roof. Should you consider this as a repair bill and deduct the entire amount as a business expense on your 1957 return, or regard this as a capital improvement and depreciate the cost over a period of years?

A. The roof is considered an improvement, not an ordinary repair. The cost of replacing the roof is deductible as depreciation spread over its estimated useful life.

Q. After you have filed your personal 1957 tax return, the government is allowed to check your return and bill you for additional tax. When does the period of time in which this may be done end?

A. In the absence of fraud or substantial understatement of income, the government has three years from the due date of your 1957 return to check your return and bill you for additional tax. Since the due date of most individual returns is April 15 and for investigation purposes all returns are treated as though filed on the due date, you should be sure to save all check stubs and receipted bills to prove your declared deductions until April 15, 1961.

A MAD DOG ON THE MARCH.

The veterinary profession is influenced by both heredity and environment. Its leaders and members are not free to act without reference to the past, any more than they can ignore the future or escape the present. It is foolish to imitate the past under present conditions, and yet contrasts are almost as important as comparisons.

The History of Some Current Problems In Animal Disease VII. Rabies

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UNFORTUNATELY, the United States has no ground for complacency about its rabies record . . . rabies still claims a score of Americans and thousands of American dogs every year." This excerpt from a report by the Committee on Rabies of the U. S. Livestock Sanitary Association (1955) points up the fact that, despite medical advances potentially able to wipe out the disease, rabies is still an unsolved public health problem. The principal reasons for this are to be found in the large wildlife population which constitutes a reservoir of infection, the traditional resistance of the American people to regulation of dogs, and to some extent, the diversity of approaches to the problem.

A glance at our American history shows that these factors were operative from colonial times; thus it is of some interest that while the potentiality of a medical solution to the problem extends back only some 70 years, the public health aspects of rabies extend at least to pre-Revolutionary times, when rabies was introduced to America. Rabies, however, was not recognized as a public health problem at this early date, nor was much attention paid to proposals made before the end of the 18th century which could have spelled an end to the problem. It is understandable that some time might be required for a new proposal to find acceptance — but how much time is too much? A century and a half after an effective program for the eradication of rabies was proposed, the problem in America remains unsolved.

An Ancient Disease

Rabies is one of the oldest diseases known to have existed in the Old World. The cry "mad dog" has resounded with terror through the ages, and its echo can be heard

today. Little children and family pets continue to be the principal victims, the disease itself has put on the cloak of superstition and misinformation, with control efforts doomed by panic and misguided efforts. Since the information available today is adequate to cope with the problem, the panic and superstition that remain must be nutured by militant minorities who strenuously oppose intelligent approaches to the problem. These include fanatics who oppose vaccination of dogs — perhaps not knowing, or unwilling to admit that it is the dog that bears the brunt of the disease which they would claim does not exist. Others are sportsmen who oppose the reduction of infected wildlife populations for well-intended, but equally selfish motives. In the opposite camp, but unintentionally allied to these misguided minorities, stands the great majority of the otherwise well meaning public that too often backs up the sound efforts of public health authorities with too little and too late.

Books could be — and have been — written on the history of rabies, its incidence, causes, prevention and "cure." The major writings on this subject provide fascinating details of the morbid story, only a few of which can be presented here.

Early References

The first requirement for effective control and eventual eradication of any disease is the recognition of the disease for what it is, and equally important, what it is not. Perhaps the first written reference to rabies can be found in the *Iliad* of Homer (B. C. ninth century) in which the poet mentions the dog-star as having a malignant influence upon mankind, and in which Hector is compared to an enraged dog. Aristotle (B. C. fourth century), the first scientific writer upon rabies, notes that the disease "is fatal to dogs and to any other animal they may bite, except man." His exemption of man is a little strange, especially since Hippocrates a century earlier had referred to a "frenzy" in persons with symptoms suggestive of rabies. He recommended preparations of boxwood as a preventive, a remedy much used for rabies by medical men and veterinarians until recently.

Celsus (B. C. first century) made a special study of rabies. He recognized that the infective agent was contained in the saliva, and that there was little hope for one afflicted by this, "a most wretched disease, in which the sick person is tormented at the same time with thirst and the fear of water, and in which there is but little hope." He recommended the use of caustics and suction on the wounds of those bitten, but cautions against the danger of the latter if there were sores or abrasions about the lips or mouth.

The poet Virgil in his *Georgics* (B. C. first century) may have been responsible for popularizing the later firmly entrenched idea that rabies originated in a pestilential state of the atmosphere: " . . . the sky fell sick and a doleful season came . . . now rabies comes to good-tempered dogs." The natural historian, Pliny (A. P. first century) repeats every fable ever invented concerning rabies, that of most consequence being the "worm" (*lyssa*) of the dog's tongue as the causative agent; if removed from pups they will never become mad; if given to bitten persons, the disease will not appear. The otherwise enlightened veterinarians of the Byzantine period (*ca.* A. D. third century) seized upon this pleasantry of removing the fibrous lyssa of the dog's tongue, and improved upon the operation by excising the "worm" from frankly rabid dogs as a cure! "Worming" of pups remained popular until late in the last century. Fleming, in his work on *Rabies and Hydrophobia* (1872) says, "The operators justly deserve the punishment which will be awarded them, should they come within the cognizance of the Royal Society for the Prevention of Cruelty to Animals."

The Greek physician, Soranus (A. D. second century), whose writings are available from the Latin version by Caelius Aurelianus (A. D. fifth century), deals extensively with rabies. Little, other than utter confusion, was added to our knowledge of this disease until the 19th century. While Soranus (*vide* Caelius) admits that rabies may appear "without any visible cause," he clearly notes that "The antecedent cause of

the disease is the bite of a mad dog or, as some say, of other animals, such as the wolf, bear, leopard, horse, and ass, or the bite of a human being who has hydrophobia . . . some incur the disease quickly after the bite. Others do so more slowly and are affected only after a year or even longer. But in most cases the disease comes after forty days."

Soranus recognizes the acute nature of the disease, with death occurring quickly. He gives a number of popular remedies, but adds that many of these notions, "which are popularly thought to have been proved sound in actual practice, are obviously quite out of keeping with the medical art." Most of his treatment is directed toward the comfort of the patient, for "the disease cannot be successfully treated," but adds, "it does not necessarily follow that the disease must be considered incurable." On localization of the disease, Soranus comes as close as anyone to the 19th century in incriminating the brain.

Human Rabies

On the question of the antiquity of human rabies, the writings of Soranus himself would settle this for most readers, but apparently he was interested in tracing it farther back. Hippocrates, he says, certainly described rabies as one form of frenzy, but did not recognize the cause. Some idea of the opinions held by Greek physicians contemporary with Soranus of their own abilities may be learned from his statement that they say: "This disease perplexes and troubles not merely the unskillful but even the most able physicians . . . an indication tending to show that the disease is a new one." Reverting to Aristotelian syllogistic logic, Soranus advances a clever, even if not medically acceptable, hypothesis concerning the antiquity of rabies: "In former times there either were or were not dogs. But surely no one would venture to say that there were not. Indeed, Homer clearly refers to the cause of the disease. If, then, there were dogs, there were also dogs that were affected with rabies. And, since it is clear that the cause of hydrophobia existed . . . it is reasonable to believe that this disease was present among the ancients."

Of additional interest is the fact that while the infectivity of the saliva of a rabid animal was not demonstrated experimentally until 1804, when Zincke produced the disease in normal dogs by innoculation with saliva from a rabid dog, Soranus had observed clinical transmission to humans by other than bites of rabid animals. One case involved a seamstress, who in repairing a garment rent by the bites of a rabid animal, moistened the edges with her tongue — which she may have pricked with the needle. And Celsus warns against the danger of sucking the wound if there are cuts or abrasions on the lips or mouth.

A clear-cut example of the infectivity of the saliva of a rabid dog is reported in the *Connecticut Courant* for April 23, 1797. A man had developed the symptoms of rabies without having been bitten; upon investigation the physician found that "The patient had trained a small dog belonging to the neighboring family, to lick an ulcerated sore within his ear, for the benefit toward its cure; that four weeks previous to that time the dog was put to licking the sore; that the operation was more than commonly painful, and that a small breach was made in the skin of the ear by the tongue of the dog; that the next day the dog was affected with symptoms of madness, and the following day it was killed . . . the disorder must have proceeded from the virus infused into the sore by the dog."

Caelius himself makes an observation of importance in later considerations of the cause of rabies. He speaks of "spontaneous hydrophobia" in man as a symptom in other diseases. During the 18th and 19th centuries, when the concept of spontaneous generation of rabies was popular, some of the more advanced writers used the term "spontaneous hydrophobia" in the classic sense; thus it is necessary to distinguish this from "spontaneous generation" of the disease. This confounding of symptoms also explains the cures of "rabies" reported by responsible medical men and veterinarians—something entirely different from the "cures" of rabies as such claimed by legions of charlatans.

Aetius, a physician of the A.D. sixth century, gives the most accurate description

of rabies in dogs to this date; he recognizes both a "mute" and a "delirious" form, but attributes the disease to the increase in temperature of the air in summer.

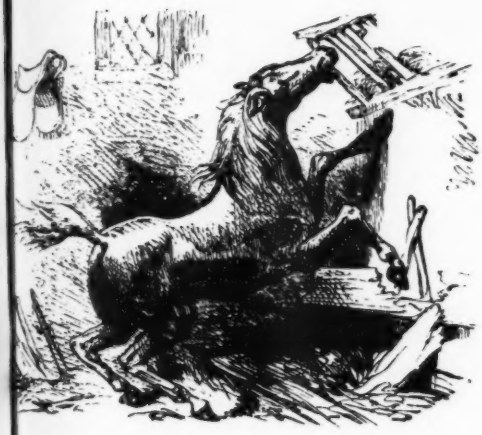
It is a curious fact that while the number of writers on rabies in ancient times would suggest that the disease was relatively common, there are no records of rabies appearing in epizootic form among any of the animal species. An apparent exception to this is the statement of Caelius that "the island of Crete . . . is frequently scourged by mad dogs." An early suggestion of an outbreak occurs in the Laws of Wales for the year 1026 in which it is stated that "during the year there was a madness among the dogs." In 1271 rabid wolves invaded the towns and villages of Franconia; domestic animals were bitten in great numbers, and 30 persons died of rabies. Spain was ravaged in 1500; in 1586 rabies was epizootic in Belgium, Turkey, Hungary, and Austria. Of the Belgian outbreak it was reported, "Dogs, with hunger and madness, run up and down the country, biting and killing cattle and one another." In 1604 rabies was widespread in Paris, where it caused great alarm. From 1708 to 1735, numerous outbreaks in all parts of Europe were recorded; in 1709 what appears to have been the first outbreak in the New World occurred in Mexico, and in Barbados many dogs were reported to have gone mad in 1741.

Rabies in America

The first appearance of rabies in the American colonies can be traced to 1753 from references to the disease in the *Archives* of Virginia, and to 1762 in North Carolina. It may be doubted that rabies occurred in epizootic form at this time, however, for an outbreak in Boston in 1768 is generally considered to be the first major occurrence in America. Despite contemporary reports that the disease was "looked upon as novel in that part of the world at this period," Cotton Tufts, in the *Memoirs of the American Academy of Arts and Sciences* (1785), states that rabies was "alarmingly frequent" among dogs in Boston in this first outbreak in 1768, and in 1770 and 1771 it was "extremely prevalent." Swine, which had the run of the streets, were the principal urban victims; in the rural areas the disease was communicated to foxes. Noah Webster in his *History of Epidemic and Pestilential Diseases* (1800) says "Rabies in dogs commenced in this part of the world" in 1769. But on July 5th of the same year, George Washington noted in his diary that he shot a dog which had bitten several of his hounds and which he suspected to be mad. This perfunctory notation, together with his memorandum to "Note the consequences," suggests more than recent familiarity with the disease, and tends to confirm the reference to rabies in Virginia in 1753.

Rabies in dogs was reported to be "common" in the mid-Atlantic states, and "raging" over all the northern states in the 1780's, by which time human rabies had become a major concern. Webster states that the gazettes of 1785 "abound with accounts of its dreadful effects," and during the following year, "many cases of hydrophobia were observed in the Southern States." In the first decade of the 19th century rabies was epizootic in foxes in Massachusetts, and as the population moved westward, rabies appears to have been communicated to wildlife reservoirs by dogs brought with settlers. Fleming states that in 1810 rabies "was frequent in North America . . . in Ohio it appears to have assumed an epizootic character, affecting dogs, wolves, and foxes." By 1860 rabies was common in the Mississippi valley, and had reached the west coast by the turn of the century.

In surveying the early knowledge of rabies it is evident that the ancient physicians had a good knowledge of the disease and had made a rational medical approach to it. Less can be said for non-professional and veterinary writers, however, for the mischief created by the more influential of these men was a major deterrent to clear thinking to the 19th century, and, indeed, is the source of many deeply rooted superstitions concerning the disease today. Except as certain of these writings have affected public opinion and medical thought upon the rabies problem, the less said about them the better. The seemingly harmless



DESTRUCTIVE IMPULSE OF HYDROPHOBIA.

Illustration entitled, Destructive Impulse of Hydrophobia, from Manning's Illustrated Stock Doctor, Philadelphia, 1880.

pleasantry of removing the "worm" from the tongue of the dog is a case in point. Delabere Blaine, whose *Canine Pathology* (1817) made him the "father" of this specialty, asks, "Is the error really a harmless one? I could readily quote more than a dozen respectable authorities, who urge the entire freedom from risk of rabies by worming."

Among these "respectable authorities" was the Rev. William Daniel, who, in his *Rural Sports* (1813), states: " . . . however Pliny may be sneered at, for what is styled his Credulity, in recommending the Worming of Dogs as a Preventive against the Dangers their Madness might excite; the Principle is founded in Truth, and Experience will, there is no Doubt, confirm its Value." For those who might be stimulated "to try an experiment," he gives a full page plate of the dog's tongue showing the position of the "worm" and the method of operation.

A Sporadic Disease in Ancient Times

The major facet of the rabies problem left untouched by the ancient writers is that of control of the disease. This may be related to the apparent fact that rabies seems to have been primarily a sporadic disease in ancient times. At any rate, it is not until rabies appeared in epizootic form that references to control measures are to be found.

Mad dogs, of course, have been slain since antiquity, but the first clear cut references to control extending beyond this measure are not found until the middle of the 18th century. Layard, in *An Essay on the Bite of a Mad Dog* (1763), states that canine rabies raged in London during 1759 and 1760 "in consequence of the mild winter and early spring." Of more importance than his concept of causation, however, is his statement: "The magistrates immediately issued a very prudent and judicious order for every person who kept dogs to confine them during a month within doors; and ordered . . . officers to destroy all dogs found at large."

This order, which should have been highly effective, most probably was not a judicial bolt from the blue, for London had suffered from rabies outbreaks for several decades. But whether the quarantine of one month was arrived at arbitrarily, or through observation, is a matter for conjecture. How well the order was carried out may be surmised from the fact that the outbreak lasted until 1762. Moreover, a bounty of two shillings was offered for each dog killed. The *Gentlemen's Magazine* for 1760 laments: "Of the dogs that will be massacred on this occasion, not one in a thousand will be mad; and of those that are mad, not one, perhaps, will be killed. Those who make it a revenue to kill the dogs will carefully avoid meddling with any that have bad symptoms, from the dread of the consequences." And in 1763, rabies broke out in France, Italy and Spain; in numerous towns all dogs were slaughtered, regardless of ownership, some 900 being killed in Madrid in one day.

During a great outbreak of rabies in the French West Indies from 1776 to 1783, all dogs in Port-au-Prince were killed by soldiers on orders from the government. So

effectual was the execution of this order that the surface of the water in the harbor reportedly was covered with the bodies of dead dogs. Rabies appeared in Peru for the first time in 1803. In one town 42 persons died in from 12 to 90 days after being bitten, but no human deaths occurred in Lima, where a general slaughter of dogs was ordered. This measure apparently became an annual dog-drive, men with iron pointed sticks being employed to knock down dogs in the streets. A contemporary report states: "To see them dragged along the streets, bound together by the waterman's lasso, leaving a bloody track behind them, and then heaped up in the public squares, where they are often allowed to lie for days, is truly one of the most painful and disgusting sights which Lima presents, and to which the bloody scenes of the bullring are comparatively nothing."

While such wholesale and indiscriminate methods belong to the past, it is more than probable that lurking suspicion that such may be the case today causes some individuals to oppose any sort of control program. Obviously, dog owners in particular are entitled to assurances concerning the status of their dogs.

To be continued in a future issue.

Toxoplasmosis: A Serious Protozoan Disease

Toxoplasmosis in man and animals is a subject of constant research by medical and veterinary scientists. The disease has been commented upon widely in human and veterinary publications. It is due to the microparasite *Toxoplasma gondii* which, during its proliferative stage, undergoes rapid intracellular multiplication. Resulting motile Toxoplasma, after rupture of the cell wall, are ready to invade other cells of the body. Apparently the organism is a widely disseminated one, since it has been found in many parts of the world in wild as well as domestic animals, including dogs, cats, swine, and cattle. It has also been found in man.

Dogs are under investigation as reservoirs of infection for man. Toxoplasma has been isolated from such excretions as milk, urine, and feces, and in man possibly from saliva. Fortunately, the parasite during the extracellular stage of its existence, is not capable of surviving for any extended period, and therefore no serious or extensive epidemics or epizootics have resulted.

In dogs, clinical manifestations are loss of condition, anemia, diarrhea, inappetance, dyspnea, and at times abdominal tenderness. Confirmation of a diagnosis is based on serologic tests. There is also a chronic form of the condition during which there may be complete absence of clinical evidence, although serologic tests are positive. On autopsy, a significant feature of the disease in dogs is the frequently appearing intestinal ulceration; in fact, this same lesion is a rather characteristic one in all carnivores, which has given rise to the belief that in animals of this nature infestation is through the digestive tract. Most intense research at this time is centered on the possible occurrence of the parasite in the muscle tissue of the meat food of man.

·VM·

The *Onderstepoort Journal of Veterinary Research* (27:227 [Oct.], 1956) records what is believed to be the first case of man contracting human type tuberculosis from a dog.

Dr. G. De Kock, a veterinary practitioner, developed a small nodule on a finger subsequently diagnosed as a tuberculous granuloma. Suspected source of infection was confirmed through postmortem examination of two dogs that had exhibited incomplete primary tuberculous complex of the alimentary tract with dissemination into the liver and lungs.—*R. R. Dykstra, D.V.M.*

Catnip

W. R. McCUISTION, D.V.M.

Ft. Worth, Texas

THE RESPONSE OF CATS to the plant commonly called catnip (*nepeta cataria*) has long been observed and has had much to do with the origin of its common name. The rapturous delight and overpowering of the emotions, with the inclination for these animals to return and recapture the sensation again and again, suggest possible addiction, should an adequate supply be available for a sufficient period to allow for habit formation. Cats can scent this plant for more than a mile when atmospheric conditions are favorable, and it has been successfully used as a lure in trapping them. However, there are some individual cats which do not seem to be attracted to the scent, and simply pass the plant unnoticed.

The ecstacy manifested by cats is characterized by a varied pattern of contortions, serpentine movements, and queer postures of their agile bodies. Direct contact with the plant is unnecessary, but the higher the concentration of odor, the more fervent will be the expression of rapture. Watchful, unwinking eyes suddenly change under the mystic influence of the catnip to those of exuding gaiety and a frolicsome spirit. Neighborhood cats will congregate during the night when the plant is blooming and at the height of its fragrance, go into ecstacy, devouring the blossoms and foliage, and when these have been consumed, will roll in their intoxication among the stripped stems and twigs until these also have been destroyed. Most of the scent comes from the flowering tops and upper third of the plant. In the winter season there is considerable scent near the base and in the roots, but little remains in the upper parts of the dead plant unless properly cured and preserved.

Catnip (*Nepeta Cataria*). Cats return to blooming catnip to recapture its intoxicating sensation, the way an addict returns to his source of supply.

Cultivation

Catnip may be grown in pots and flower boxes kept in the cat ward of animal hospitals. It usually provides for good relationships between veterinarian, client, and patient. When cultivated outside in sandy soils near the hospital, the plant may attract serenading toms and thereby create problems made common by possible carriers of virus disease.

Some catteries cultivate catnip under net wire and harvest it during the blooming season, taking the upper top third of the plants, which includes the flowers and leaves. These are carefully cured in the shade for a few days, which helps in retaining the green color. Next, the dried flowers, seeds, and leaves are stripped from the stems and packed in air-tight fruit jars or wide mouth bottles. When the curing process has been completed, the volatile oil containing the scent can be preserved for several months. Clients are happy to receive small tokens of catnip, and seem interested to learn that it belongs to the mint family. The dried catnip leaves, flowers,

and seeds may be sprinkled on food for patients where these serve as an appetizer, or may aid in preventing spells of nostalgia which sometimes obscess cats when confined away from home.

A European Herb

Catnip was introduced to this country from Europe for cultivation in herb gardens at a time when many grandmothers had faith in the medicinal value of this perennial. With the alley cat acting as an accomplice, it escaped the herbalist, and like the English sparrow, soon became naturalized and well adapted to its new environment. Today it grows wild in many scattered areas, along fence rows, in the vicinity of old buildings, and in gardens, places where cats linger in leisure to await their prey and unconsciously distribute the tiny seeds which are clinging to their coats. Rarely does catnip thrive in the open fields where there may be a long exposure to the summer sunlight. Catnip has a high rating among beemen as a honey plant because of its continuous blooming period throughout the summer months, but cats appear to appreciate it chiefly because it offers a means of escape from the boredom of their carefree daily existence.

Blood Values of the Beagle

Continued from page 138

Conclusion

Blood values in the dog have been presented from embryonic development to the age when senility becomes manifest. Definite trends are apparent during the first year of life. At one year of age blood values are characteristic of those found in the adult. A diurnal pattern with physiological variations and sex differences were noted. This diurnal pattern was similar to that reported for other species. It was also noted that erythrocytic values were consistently higher in this kennel as compared to those reported in the literature. Hemoglobin values in our male dogs approach 18 grams per 100 cc. The major difference between dogs used in this study and those in the field is in the dietary regimen.

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Deafness in White Cats

There is still a common impression that all white cats, particularly blue eyed ones, are deaf. The facts are that this defect does affect some white cats but not all of them. By neutering those that are undoubtedly deaf, fanciers have to a large extent overcome this defect. Furthermore the hard-of-hearing white cat that has been emasculated, if not subjected to heavy traffic and other hazardous areas, frequently has better eyesight, with an unusually developed sense of caution. Such animal will be a useful pet for as many years as the congenitally normal cat. Test the hearing of the white ones, and then act accordingly.

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Editorial

LIVESTOCK GROWERS EVALUATE the VETERINARIAN

During the past 25 years, member companies of Associated Veterinary Laboratories have invested over $1,000,000. through the American Foundation for Animal Health, to inform the public of the value of veterinary service.

During 1957, the Farm Research Institute, Urbana, Ill. was employed by the Foundation to conduct a survey to determine the effectiveness of its program. In the interest of maximum value it was decided to frame a number of questions which would also reveal the attitudes and habits of farmers with regard to various aspects of animal health problems.

Survey Technics

The questionnaire was mailed to 1,856 farm families in Illinois and Indiana, all of which are members of the Farm Research Institute Farm Panel. These families were selected to provide a scientifically accurate cross section of farmer opinion. A total of 1,798 returns (96.9%) were received.

Facts revealed by the survey are detailed in the following paragraphs and tables. Highlighting this information is the fact that 83.9% of all farmers reported that they employed the services of a veterinarian during 1956. It is also notable that 30.4% reported increased use of available veterinary services during the past five years.

The most important reason for increased use was again in the number of livestock; but greater appreciation for services rendered by the local practitioner, and increased interest in animal health, were also high on the list. The work of the American Foundation for Animal Health was cited as an influence in stimulation of the last two factors.

Strong preference for using veterinarians for vaccinations and for certain types of animal illnesses, was indicated, but farmers place about equal dependence on self-treatment and the veterinarian in cases involving general animal unthriftiness or animals being "off feed." Questioned farmers emphatically indicated that they would not want to be without veterinary service, and that they hold the veterinarian in high esteem. The majority (76.9%) held the veterinarian to be as important to animal health as the physician is to human health.

Source of Medical Materials

Table 1. Where Farmers buy Veterinary Drugs and Vaccines

Source	Total %
Veterinarian	85.4
Drug store	24.7
Feed store	14.7
Hatchery	11.8
Farmers coop.	11.6
Other	2.2

Farmers were asked to indicate their usual source of animal medicines and vaccines. Answers to this question are tabulated. (See table 1.)

The veterinarian was, by far, the most common source for purchase of drugs and items ordinarily designated as dispensing products. Percentages in table 1 add to more than 100 because a substantial number buy from more than one source.

Use Increased During Past Five Years

Almost one-third (30.4%) reported that their use of veterinary services had increased during the past five years.

Table 2. Reasons for Increased use of Veterinarians

Reasons for increase	% Answering
Increased use during last 5 years	30.4%
Reasons given by those reporting increased use of veterinary service.	
Have more livestock	50.5
Have more livestock sickness	18.1
Increased appreciation of veterinarian	13.8
New diseases and new treatments	9.6
Increased interest in animal health	8.4

Uses of Veterinary Service

The survey gave an interesting breakdown of the ways in which farmers make use of veterinary service. Figures in table 3 tabulate the volume of calls for veterinary service. For example, 28% of all calls for swine (hogs 17%; pigs 11%) were made because of illness in droves. It is interesting to note that a high percentage of service performed for farm clients involved small animals.

Table 3. Uses Made of Veterinarians in 1956

Animal	Services performed by veterinarian: Sickness %	Vaccination %
Hogs	17.0	19.2
Pigs	11.0	21.9
Dairy cattle	32.3	6.8
Beef cattle	19.4	5.7
Calves	13.9	19.8
Sheep	5.0	0.7
Chickens	4.7	2.2
Other poultry	0.4	0.3
Dogs or cats	7.5	23.2
Other animals	1.0	0.4

Comparison with Self-Treating

One measure of the value a farmer places on the services of a veterinarian is the extent to which a veterinarian would be called for specific animal disease problems, as compared with the farmer handling the problem himself. To obtain such a measure, each respondent was given a list of animal health or disease problems and asked to specify for each problem whether he would, generally, (1) call a veterinarian, (2) handle the job himself, or (3) follow some other course of action. Results are shown in table 4.

In addition to having farmers compare veterinary service with self-treatment, respondents were given a list of ten statements or references concerning veterinarians and their services and were asked to check all items that generally described the way they feel toward veterinarians. Results are presented in table 5.

It is clear from answers given in this

Table 4. How Animal Disease Problems would Generally be Handled

Kind of problem	How Handle: Call vet. %	Handle by self %	Other %
Vaccinating swine	69.7	19.9	0.4
Vaccinating calves	78.9	10.3	0.6
Inoculating poultry	31.1	29.4	10.6
Plant poisoning of animals	80.6	3.1	0.6
Swine flu	64.4	18.8	0.6
Mastitis in dairy cows	39.2	44.4	1.4
General unthriftiness	28.5	47.4	6.7
Animals "off feed"	37.0	51.5	4.3

Table 5. Attitudes toward Veterinarians

Attitude	% Answering
Would not want to get along without them	81.7
As important to animal health as doctors are to human health	76.9
Very important to success with livestock	73.9
Prefer to buy medicines and vaccines from them	36.8
Use them only in emergencies	21.7
Their services are too expensive to use	9.9
Often do not know their business	4.8
Prefer to depend on own knowledge	2.2

portion of the questionnaire that livestock growers have a high regard for veterinarians. Few indeed would want to get along without them. Most (76.9%) think the veterinarian is as important to animal health as physicians are to human health. They consider the veterinarian important to success with livestock. A small minority (9.9%) believe that veterinary services are too expensive and only 2.2% prefer to depend on their own knowledge in handling all of their animal disease problems.

Sources of Information

Figures in table 6 show how respondents answered the question: "Which of the following sources of information have, (1) helped you to increase your knowledge of the health and disease problems of livestock, and (2) influenced you to call a veterinarian?"

Table 6. Influence of Various Sources of Information

Sources of Information	Knowledge %	Calling a vet. %
University bulletins	51.4	13.7
Vocational agricultural teachers	25.0	6.9
County agents and farm advisers	35.2	13.7
Veterinarians	59.8	21.2
Farm magazines	74.9	18.1
Radio and television	23.9	6.0

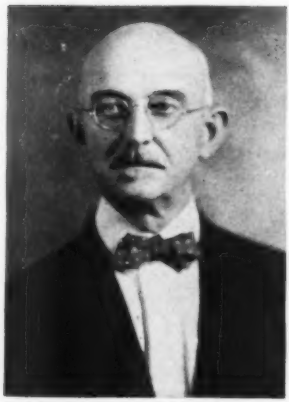
Figures in the above table served to confirm the effectiveness of the program conducted through the American Foundation for Animal Health. Approximately 75% of the Foundation's educational program to farmers is channeled to farm magazines, and about 20% to radio and television stations. It will be noted that these figures closely parallel the percentages indicated by farmers as sources of knowledge on animal disease problems.

We are indebted to Associated Veterinary Laboratories for releasing the interesting facts revealed in this survey. We believe it is the first comprehensive, scientific study ever made of farmer opinion directly related to veterinary service. The survey should serve as a valuable guide for practicing veterinarians. The highly favorable attitude of the vast majority of farmers as indicated in this extensive, well planned study, should reassure those who may be concerned about the status of the profession in the eyes of the public, and particularly the growers of livestock.

Susceptibility to Cancer

Raise a highly cancer-susceptible animal in a germ-free environment and it will not develop cancer. This statement made by Dr. James A. Reyniers of the Notre Dame University's Lobund Institute (*Medical News*, Dec. 16, 1957) provides a new link in the chain of evidence tying malignancies to some infectious etiological agent.

Cancer prone mice were used in experiments reported by Doctor Reyniers. Delivery by sterile technics and rearing young in a germ-free environment by second generation germ-free foster mothers also broke the line of possible disease transmission through milk. Tumors have not developed in unexposed survivors, whereas 85 to 90% of those removed from germ-free chambers and placed under ordinary environment succumbed rapidly.



T. A. Sigler, D.V.M.

Former President of A.V.M.A. Succumbs in Indiana

Dr. Thomas A. Sigler, IND '02, Greencastle, Ind., practitioner, lecturer, and author, died at Greencastle June 24, 1957. He had been an active practitioner for over 50 years, and was well known for his interest in equine medicine. He served as president of the A.V.M.A. 1926-27, and was active in practice and association affairs throughout his career.

Doctor Sigler came into the profession at a time when only 12 veterinarians could gather to form the Indiana Veterinary Medicine Association, of which he was a charter member. As a result of the activities of this pioneer group, the Indiana Veterinary College was established. During his half-century of practice, Doctor Sigler was a moving force in sparking the state-wide effort that has since raised the esteem of the veterinary practitioner from that of social ostracism to a position of community leadership. County meetings, cooperative efforts of livestock groups, all paved the way for the foundation of livestock disease control methods as they exist today.

Doctor Sigler had a deep personal interest in harness racing, and the professional training that he brought to the Indiana harness tracks earned for him a stellar role in the racing hall of fame. His concern and advice were instrumental in developing such harness racing greats as Dan Patch. His initiation into the veterinary field came at the time when the horse was the most frequent patient of any veterinarian, and he never lost his interest in treating them.

His career recalls the transition of prophylactic products, changing trends, and technics that have attended the march of veterinary medicine through the years. Doctor Sigler sometimes recalled that the technic for vaccination of calves against blackleg has progressed through a number of stages, as has the veterinary profession itself. Initial technic was to suture a length of string carrying killed organisms through the skin. Injecting dry pellets of killed organisms under the skin with an ingenious trigger syringe was substituted for the earlier technic. Later aggressins replaced pellets which in turn were replaced by filtrates, bacterins, and finally combination bacterins having high efficacy.

Doctor Sigler was a keen student of the changing trends and frequently instructed his collegues from the platforms of professional assemblies. In commemoration of his 33rd appearance on the annual meeting program of the Mississippi Veterinary Medical Association, of which he was an honorary member, he was presented with a portrait of himself.

Dean R. S. Sugg Suffers Fatal Stroke at Alabama

Dr. R. S. Sugg, dean, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, suffered a fatal stroke on Jan. 4, 1958. He had suffered a serious heart disease for some time.

Born in Edgecourt County, N. C., in 1893, where he received his elementary education, Sugg transferred to A.P.I. where he earned both a B.S. and D.V.M. degree.

After a brief experience in practice he accepted a position as instructor at Auburn in 1917. He was subsequently promoted to assistant professor in the Department of

Bacteriology and Pathology, as state extension animal husbandryman, and finally as dean of the veterinary school in 1940.

His career as a teacher was twice interrupted by military service. He entered the U. S. Army in 1918 and was discharged a year later as a captain. Again in 1942, he answered the call and served as chief, Veterinary Service Branch, Camp Shelby, Miss. He was separated to the inactive reserves in 1946 with the rank of colonel.

Devotion to duty and application of remarkable talents as a teacher were not without rewards. In 1951, he received the XII International Veterinary Congress Award. Mentioned in the citation was his leadership toward regional education in the southeastern states. Through persistent efforts, Dean Sugg was able to effect an agreement between state governors of the South that marked the beginning of regional education, with veterinary and human medicine being the first to benefit.

Dean Sugg contributed immeasurably to organized veterinary medicine. He served as president of both his state and the Southern Veterinary Medical Association. He specifically encouraged a spirit of cooperation among practitioners, regulatory control agencies, and various groups of the livestock industry. His very human approach to problems was distinctive and genuine, and contributed to improving livestock culture in Alabama and gained confidence for both himself and the profession.

Leon L. Parker, D.V.M.
1886-1957

Dr. Leon L. Parker, one of the most prominent veterinarians in New York, died in Memorial Hospital, Catskill, N. Y. December 31 of a heart ailment after being ill since the latter part of October. He was 71 years of age.

Doctor Parker practiced in Greene County for nearly half a century and for many years took a young graduate for one year of work and training. Many "Parker trained men" are successful practitioners today.

Hubert Schmidt, D.V.M.
1886-1957

Hubert Schmidt, D.V.M.

Dr. Hubert Schmidt, TEX '08, who has been credited with 40 years of distinguished service to the livestock industry, died January 14 as a result of complications from injuries suffered in an automobile accident. He was 70 years of age.

Doctor Schmidt had retired in 1956 after serving as head of the Department of Veterinary Science at Texas Agriculture Experiment Station. He had been connected with the Texas Agriculture Experiment Station since 1913.

He was best known for studies which led to the eradication of Texas tick fever, which once killed entire herds of cattle. His research also resulted in a discovery that certain back and loin diseases in cattle originated in the bones, and established the now standard practice of feeding livestock sterilized bone meal to prevent it. His experiments disclosed that hyperkeratosis in cattle was caused by a toxic substance which came from lubricants used on machinery in cottonseed mills and farm implements. He developed a method for vaccinating sheep and goats to prevent soremouth and was an authority on anaplasmosis.

Doctor Schmidt was born September 24, 1886 at Comfort, Texas. In addition to his degree from Texas A. & M., he earned a graduate degree after study at the Royal University School in Berlin, Germany.

On January 9, 1958 at the Annual Conference for Veterinarians at Ithaca, the Alumni Association of the New York State Veterinary College presented Cornell University with a portrait of Dean Hagan. Dean Hagan came to Cornell in 1916, and was made dean of the College in 1932. President of Cornell, D. W. Mallott (right) is shown here congratulating Dean Hagan (left).

CORNELL VETERINARY CONFERENCE

In addition to an absorbing program arranged for the 50th Annual Conference for Veterinarians in the new facilities at Cornell, the occasion offered opportunity to honor Dean W. A. Hagan on his completion of 25 years of distinguished service as Veterinary Dean and his 40 years of service to the school.

The Alumni Association of the New York State Veterinary College presented a handsome portrait of the Dean at appropriate ceremonies.

Dr. Hadley Stephenson, professor emeritis, recalled in his address that the first conference held 50 years ago resulted from the efforts of Dr. V. A. Moore, then dean of the College, in pursuing a policy of responsibility to graduates as well as undergraduates. Dean Moore expressed the sincere desire to render service to the state's practitioners toward more efficient veterinary service. He recalled that at the first Conference that Prof. S. H. Gage spoke on the "magic lantern" as a means of illustrating lectures.

Successful conferences have been the rule at Cornell judged by their value for postgraduate training. Attendance has grown steadily; approximately 700 were in attendence at this meeting which taxed the facilities of the new and extremely well designed and comfortable James Law Auditorium.

Successes of these meetings for veterinarians through the years have been responses to three pressures, said Doctor Stephenson: "(1) His necessity of being as good as his neighboring colleague, (2) his duty to the public to advance the scope and usefulness of veterinary medicine in every way he can, and (3) the inner compulsions to keep on learning for the patient's sake."

The program for 1958 featured 40 speakers on subject of advanced interest. Consideration and discussions concerned; Fission Products in the Food Chain; Use of Steroids, Iron Nutrition, Fat and Cholesterol, Electrocardiography, Tranquilizers, Virus Diarrhea, New Concepts of Anesthesia, Avian Hepatitis, and others. Time was allowed after sessions for conducted tours of the new buildings and for staff conferences. The latter are a feature at these annual meetings. Faculty members made themselves available in their offices or laboratories for private interviews with visitors to the campus and conference.

Equine Practitioners

The American Association of Equine Practitioners convened for its third annual meeting at Chicago on Dec. 16-17, 1957. An excellent program was arranged considering equine medical and surgery problems facing practitioners of the specialty. The Association is active and includes well over 200 members, or almost all of those in the United States and Canada whose practice is concerned largely with equine medicine.

Open Forum

Dr. Horace N. Davis of Lexington, Ky., president of the Association, prefaced the scientific sessions with a report on the rapid growth and accomplishments of the organization during the past year. Representatives of allied groups associated with horse racing also participated in an "Open Forum" on issues of mutual interest. Organizations represented included:

Thoroughbred Club of America, by Dr. A. H. Davidson, vice president.

National Association of State Racing Commissioners, by Commissioner James H. Inglis, chairman of Michigan State Racing Commission; chairman of Illegal Practices Committee, and third vice president of N.A.S.R.C.

Trainer's Guild, represented by Dr. Clarence Dee who brought a pledge of cooperation from this organization.

Thoroughbred Racing Protective Bureau, Mr. Spencer Drayton, director, who pledged his organization's wholehearted support and cooperation.

Special Reports

Following the "Open Forum," Dr. David K. Detweiler, College of Veterinary Medicine, University of Pennsylvania, discussed and demonstrated results from his study of the equine heart, outlining the use and interpretation of the electrocardiogram, oscilloscope, and other research tools in order to develop reliable diagnostic aids for the evaluation of abnormalities in the heart function of the horse. Doctor Detweiler reported that he is accumulating a large series of comparative data to be used as the basis for diagnostic evaluations.

Dr. M. B. Teigland, Opa Locka, Fla., reported on work being done toward developing a diagnostic procedure designed primarily to identify the chronic carrier of equine infectious anemia without the need for a test horse to confirm the diagnosis of the disease. Dr. Teigland's study is being conducted in cooperation with the School of Medicine, University of Miami. Excellent movies of clinical and experimental cases were shown.

A report on the use of a new surgical technique to correct "bowed" tendons was presented by Dr. D. L. Proctor, Lexington, Ky. Though complete postoperative evaluations have not yet been compiled, Dr. Proctor disclosed that he anticipated a recovery rate which will be significantly higher than with other therapy currently in use.

The use of ether as a general anesthetic in the horse was discussed by Dr. William O. Reed, Elmont, N. Y.

Marshall Cassidy, vice-president and director of racing for the Greater New York Association and Executive Secretary of the New York Jockey Club, described the legislative, regulatory and scientific background of attempts to detect and prevent the use of stimulants in race horses. Mr. Cassidy pointed out the need for greater cooperation among all segments of the racing "field," emphasizing the important contribution that the A.A.E.P. can make in this regard. He also reported that the N. Y. Jockey Club is sponsoring a research project in the blood typing of Thoroughbred horses.

Officers Elected

Dr. E. A. Churchill, Centerville, Md., is president; Brig. Gen. Wayne O. Kester, USAF (Ret.) was named president-elect; and Dr. T. E. Dunkin, Chicago, secretary-treasurer. Dr. M. L. Scott, Akron, Ohio is executive secretary.

Cutter Laboratories Assessed in Vaccine Case

In a pilot suit, the Alameda (California) County Superior Court jury awarded $147,-300. to two child poliomyelitis victims. This was obviously a test case of two of 44 suits totaling $10,000,000. in damage demands filed against Cutter Laboratories, Berkeley, charging negligence in the manufacture of the Salk vaccine and of breaching warranty that the product was free of dangerous ingredients.

The ensuing eight-week trial considered voluminous evidence including a deposition from Dr. Jonas E. Salk. Famed virologist and Nobel prizewinner Wendell M. Stanley took sharp issue with Salk that formaldehyde kills virus particles "in a neat straight line fashion." As for testing methods before the incident, Doctor Stanley voiced the opinion that "in the light of subsequent knowledge they were inadequate." Attorneys for other manufacturers against which similar suits have been filed followed proceedings, as did counsel for insurance firms.

After two days of deliberation, the eight-woman, four-man jury freed Cutter of any negligence, but in a split decision found that the firm should be held responsible in guaranteeing purity of its product. Judge Ledwick has been quoted in newspaper reports as admitting the verdict to be "directed" on the basis of "implied warranty." This unique action of the judge in virtually ordering a verdict of breach of warranty is understood to set unusual precedence. The case has been appealed and may or may not point the way to settlement in damage suits involving allegations from direct use of poliomyelitis vaccine manufactured by Cutter. Approximately half the total number of suits involve "associated" allegation.

Important points of law that may have far-reaching effects in the drug and biological industry are involved. Attorneys for the plaintiffs sought to establish the theory of "absolute liability" of drug manufacturers regardless of care employed, testing procedures as required confirmed, or failure to support negligence. This unprecedented "ultrahazardous activity" doctrine that has been advanced seeks to establish that a vaccine manufacturer is liable simply because danger is inherent in a product. This concept will doubtless have influence not only on labeling but on progress in development of new products, price structure, distribution, and other matters. The final disposition in this case will likely influence some matters concerned with marketing veterinary biological products.

MODERN STANDARDS for MEDICAL CARE of ANIMALS

Medical care of pets has become virtually indistinguishable from that available to their owners—a part of a notable trend in veterinary medicine, according to a report in the current issue of *Time* (Feb. 3, 1958, p. 38). Pictured is a scene in surgery of Dr. Norman L. McBride, Pasadena, California.

Though unfortunately titled Veterinary Revolution, the brief article compliments professional efforts and points up the alertness of practitioners in applying advanced medicine technics for the relief of animal suffering and prolongation of life. These processes have been evolutionary, not revolutionary. They have evolved through a century of scientific progress, though certain spectacular advances are recent.

Veterinary service to livestock is mentioned only briefly, but the author might have added informatively to his copy had he pointed out that equally significant progress has been made in the application of medical skills for the prevention of disease in domestic livestock. Many examples might be cited. These have contributed to public health, the financial soundness of livestock culture, and the wealth of the nation.

Animal Health

R. R. DYKSTRA, D.V.M.

"Swimmers"

The common term of "swimmers" as applied to dogs, is generally said to be a form of fetal rickets. It is in fact an imperfect ossification of the cartilage in long bones mostly in the epiphyseal region. Technically some writers refer to it as "achondroplasis" or as "chondrodystrophia fetales." Affected puppies, especially the thick muscled breeds with short legs, are bow-legged and walk with a spraddling gait. No specific form of treatment is known though there are reports that fish liver oils, lime salts, and direct sunlight are beneficial in milder cases if this regimen is started before symptoms are advanced. The bitch also should be similarly dieted. If treatment is not at all helpful it is advised not to continue the dam—sometimes the assumed heritable taint is in the sire— for breeding purposes.

Dicumarol as an Anticoagulant

Physicians are lauding warfarin, also known as "dethmor," "coumadin," and others, as almost ideal anticoagulant in the handling of such maladies as embolism, phlebitis, myocardial infarction, and comparable conditions. It is especially valuable for "thinning" the blood as it seems to be equally effective when administered either orally, intravenously, intramuscularly, or rectally. Its administration is followed by a fairly prompt hypoprothrombinemia, which is safely maintained by daily therapeutic doses.

Veterinarians have most frequent professional contact with warfarin (the rat poison) in handling cases of accidental poisoning of domesticated animals. Warfarin is usually marketed for rat destruction purposes in the form of 0.5% of this synthetic chemical with 99.5% of starch, or coated on grains of sand in the same proportions, for use in drinking water. Basically warfarin is dicumarol, the sweet clover poison that veterinarians treat effectively in cattle with vitamin K.

Grub Control with ET-57 Systemic Parasiticide

A notice appearing recently in the agricultural press carries the information that the chemical compound presently known as ET-57 appears to be of value as a systemic parasiticide in early tests for the prevention or control of the ox warble grubs (*Hypoderma lineatum*). The agent has not yet been marketed commercially. When used it may be given by way of the mouth.

Although cattle may be treated at other times, best results follow the use of the remedy in May. Good results also were reported on drenching animals in July and December.

Hides are classified by large packing houses as no. 1 when they contain four or less grub holes; no. 2 with five or more.

Infective Agents in Milk Samples

We have been advised informally by bacteriology technicians of changes in the usual infective agents observed in milk samples from cows suffering clinical mastitis. These technicians make many routine examinations, both microscopic and cultural, of milk samples derived from mastitis cases. They are gaining the impression that because of the extensive use of antibiotics for infusion into udders that the usually ascribed causative organism, *Strep. agalactia,* is in general infrequently isolated. A hemolytic staphyloccus, apparently resistant to antibiotics ordinarily employed, is supplanting it. If the foregoing assumptions are correct, then at this stage in the development of mastitis treatment there is no general relief. Usual causative organisms are supplanted by others of a different nature.

Public Health

JAMES H. STEELE, D.V.M., M.P.H.

Protecting the Public Against Nuclear Radiation

Nuclear radiation in all its forms is generally harmful to living organisms, and the radioactive contamination of any inhabited area presents a major public health problem which must be solved, if nuclear energy is to be fully utilized. All medical and public health workers must, therefore, be trained to meet the new demands made on them, according to the World Health Organization's Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel.

During its fourth session just held in Geneva under the chairmanship of Sir Ernest Rock Carling, London, the Committee drew up a training schedule for all categories of public health personnel. This will bring hospital administrators, industrial hygiene workers, sanitary and hydraulic engineers, veterinary health officers, mental health specialists, public health nurses, et cetera, back to school for periods ranging from one day to several weeks to learn how to protect the public against radiation. The same type of training is envisaged for public health workers now undergoing their basic studies.

Although there is nothing to suggest that large-scale risks from accidents associated with the peaceful uses of nuclear energy will be anything but very rare, the public health worker will be required to know how to protect the public in case a reactor accident does happen. However, an even more important task will be in relation to the long-term effects on the population, of the continuous discharge of small quantities of radioactive material.

Fundamentally, the Committee stated, the approach must be one of prevention through the limitation or elimination of exposure, since, at the present time, there is no entirely satisfactory method for alleviating the effects of radiation injury once it has been sustained, except in certain late cases through plastic surgery.

It is now recognized that there is a public health responsibility beginning with the selection of the site of the reactor and extending through the consideration of design to the pattern of the actual operation, in addition to control of the use of other radioactive equipment and substances.

The WHO Committee noted that although *x*-rays were discovered at the end of the last century, our knowledge of many radiation injuries is still meager. It is difficult to define disturbances caused to delicate cellular mechanisms, the normal function of which is still being studied. In addition to the classical skin and blood disturbances familiar to radiologists, we are now aware of such effects as cataracts. However, it was felt that exposure to acute irradiation would be rather rare in peaceful uses of nuclear energy.

Shortly after this report was released an accident occurred in England which affected cows near the British experimental station for nuclear energy. All of the milk from these cows is being dumped in the Irish Sea.

Study of Swine and Horse Sera

The World Health Organization has arranged an international study of swine and horse sera to determine if Asian type influenza is spreading among animals. The Communicable Disease Center is cooperating in this study and has requested state public health and veterinary research services to report any outbreaks of swine influenza and collect swine serum samples for study.

·VM·

In mid-August 1957 Turkey reported that many of the provinces had experienced outbreaks of influenza. By early September epidemic influenza was present in Istanbul. The city had reported 50,000 cases by September 11.

By the end of August most of the epidemics of other countries of the Middle East had subsided.

Nutrition

MORRIS ERDHEIM, D.V.M.

Grass Tetany

Grass tetany is seen frequently in cattle soon after they are turned out to pasture in the early spring. It is related to a hypomagnesemia, and has been recognized as grass tetany, grass staggers, and wheat poisoning.

Within a few days after the cattle have been on young grass, the blood magnesium level falls. Observable symptoms develop soon after. These are anorexia, extreme nervousness, convulsions, and "milk fever" attitude. However, the onset of tetany may be so rapid that no other symptoms are observed. Injecting magnesium salts intravenously effects rapid and dramatic recovery.

It had been thought that the hypomagnesemia and resulting tetany are brought about by a simple magnesium deficiency. It is true that on spring grazing, the magnesium intake is likely to be low. This is related to the low magnesium content of the grass. Moreover, this young grass is high in moisture and low in dry matter. Each mouthful, therefore, contains less magnesium than an equal weight of dry feed.

Nevertheless, even under these conditions, cattle may be getting 10 to 15 gm. of magnesium daily. While this is about half the intake on winter rations, Balch, University of Reading, believes that it should be adequate as far as magnesium needs are concerned. He refers to balance trials which indicate that a typical cow need retain only 2 to 3 gm. and secrete 1 to 3 gm. in the milk.

Apparently more than a magnesium deficiency is involved. Poor utilization and absorption appear to be factors. For some reason, magnesium remains in the gut and is not absorbed.

A clue to contributing causes to the development of the hypomagnesemia and symptoms of tetany is the finding of the condition on farms where large amounts of nitrogen fertilizers have been applied to the land. The young grass has a high nitrogen content. In the rumen, much of this nitrogen may form ammonia. The Reading workers found that the addition of ammonium compounds to normal rumens through fistulas caused a marked drop in the blood magnesium levels. This suggests that the ammonia may well be one of the contributing factors in the development of the hypomagnesemia seen in grass tetany.

Dutch workers have suggested that potassium in young grass can have a similar effect. There may also be other possible causes. In any case, it is likely that anything which can prevent the absorption of magnesium from the rumen and gut, could contribute to the onset of symptoms.

In this country, calf tetany (fits) has been a problem in various sections. Apparently, this condition is similar to grass tetany in cows. Here too, low blood magnesium levels are noted.

Current research in New Zealand, England, and in the United States will give answers needed. Effective treatment and control measures are available.

In acute cases, intravenous magnesium effects dramatic results. Where a history of grass tetany exists, the addition of 4 lb. of magnesium sulphate to a ton of feed has been a satisfactory prevention measure.

Considering the observations made by the British workers on the apparent effect of high nitrogen fertilization of soils on the incidence of grass tetany, the addition of magnesium sulphate to the feeding programs in the spring of the year might be good insurance on such farms.

Howell at the Astoria Experiment Station, Oregon, reports favorable results from the use of magnesium sulphate in herds with a high incidence of calf "fits." In such cases, dry cows are fed magnesium sulphate in the feed prior to calving. This appears to prevent development of tetany in the calves.

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1. Balch, C. C., Rumen Studies. *Eastern Feed Merchant*, Feb. 1958, Pg. 35.

2. Howell, H., Trace Minerals in Cattle Feeding. Proc. Oregon Animal Industry Conf. 1957, Pg. 54.

Poultry Practice

W. R. HINSHAW, D.V.M., Ph.D.

Over 200 papers were presented at the 46th annual meeting of the Poultry Science Association, Aug. 6-9, 1957, Columbia, Mo. In addition to the following, selected reports of special interest to veterinarians have appeared in VETERINARY MEDICINE, *53:110 (Feb.) 1957.*

Poultry Diseases

The wide range of subjects covered included lymphomatosis with emphasis on the cultivation of the causative agents. Two groups of investigators, Fontes, *et al.* of the USDA, Regional Laboratory at East Lansing, Mich., and Sharples, *et. al.* of American Cyanamid Co., used the RPL 12 strain of virus and both were successful in cultivating it using chicken embryonic liver cells. Cytopathogenic effects were observed as early as 18 hours by Sharples and in 48 hours by Fonte. Proof of successful propagation was obtained by production of disease in both chicken embryos and chicks with tissue cell produced virus after from 11 to 15 serial passages. Burmester, *et al.*, of the East Lansing laboratories, reported on electron microscopic studies using RPL 12 strain of virus. They reported among other characteristics that the virus particles are approximately 90 millimicrons in diameter and have a centrally located zone of greater density which is approximately 30 millimicrons in diameter.

Coccidiosis

Coccidiosis continues to be a subject for research in attempts to find new remedies. Two papers each from research departments of commercial manufacturers described new drugs for control of this disease. Morehouse and McGuire, Dr. Salsbury's Laboratories, described 3-5-dinitro-benzamide and several derivatives and reported on their effects as coccidiostats. The preferred compound was 3-5-dinitro-benzamide.

Otto, *et al.*, Abbott Laboratories, reported on the value of menadione sodium bisulfite complex (klotogen F®, Abbott) in preventing mortality due to hemorrhage in *Eimeria tenella* disease. This drug apparently reduced mortality by reduction of hemorrhage. Their trials were based on additions to basal diets which were deficient in vitamin K. Stephens, *et al.*, University of Tennessee, also studied the relation of vitamin K to mortality from *E. tenella* type of coccidiosis. They used menadione sodium bisulfite and alfalfa leaf meal as sources of vitamin K and found both effective in reducing mortality from coccidiosis.

Hemorrhagic Syndrome

Hemorrhagic syndrome (see *Vet. Med.*, 51:42, 1956) was the subject of seven papers with almost as many suggested causes reported. In Indiana, Henderson, *et al.*, Purdue University, found that the nature of hemorrhage syndrome was an aplastic anemia. Feeds from some of the flocks studied by them produced signs of aplastic anemia but could not account for all cases, nor could drugs since none of the flocks had been fed medicated feeds. Possible involved mechanisms suggested by them were (1) primary toxic factors, (2) secondary factors, and (3) possible deficiencies of nutritional factors.

Sanford, *et al.*, Kansas State College, concluded that the hemorrhagic syndrome in broilers observed by them is related to stress factors and not to vitamin K deficiency. Certain antibiotics and animal fat fed at a 5% level increased the incidence of hemorrhages in their trials. Bletner, *et al.*, Ohio Agric. Exp. Station, studied the effect of mechanical bleeding followed by treatment with sulfaquinoxaline on the hemograms of chicks. Sulfaquinoxaline alone as following mechanical bleeding reduced hemocrits, but mechanical bleeding had no consistent added effect.

Beta-amino-propronitrite (BAPN),

found in sweetpeas was first reported to cause internal bleeding in turkeys by the University of Wisconsin (see *Vet. Med.*, 52:411, 1957). This substance was verified as cause of internal bleeding in chicks by Barnett, *et al.*, Clemson Agricultural College. Barnett, *et al.*, found that the incidence of BAPN induced hemorrhages increased by 30 to 40% when 10 or 20% fat was added to the diet.

The remainder of the papers on causes of hemorrhage in birds were concerned with vitamin K. One phase of the hemorrhagic syndrome in birds which was not covered or referred to by any of the speakers is that which is related to fungal infections. For reference to this phase the reader is referred to a paper by Forgacs and Carll (*Vet. Med.*, 50:172, 1955).

Chronic Respiratory Disease (CRD)

A total of four papers were presented on CRD. Fahey and Crawley, University of Canada, summarized the control methods used in Canada. Their program is based on eradication to be accomplished by injection of all infected flocks with streptomycin, combined with serological testing utilizing a hemagglutination-inhibition (HI) test. The success of this procedure is attested, according to them, by the fact that there are now 100,000 PPLO-free breeders in Canada producing "clean" broiler chicks. In many instances "clean" flocks have been maintained through five generations under field conditions. A serum spot plate test for detection of PPLO carriers and the use of the test in obtaining PPLO clean flocks was described by Hammar, *et al.*, American Cyanamid Co.

Treatment of chickens suffering from CRD-with penicillin and oxytetracycline in the feed was discussed by Price, *et al.*, Chas. Pfizer & Co. Oxytetracycline at the rate of 500 gm. per ton reduced the mortality from 54% in the controls to 2.5%. No reduction in mortality was observed at any level of penicillin.

McNeil, Alabama Polytechnic Institute, reported on her studies on the role of egg transmission of PPLO. Her method of attack was to determine the incidence of PPLO in the reproductive tract of both males and females and to determine if the strains isolated were identical with the ones found in the respiratory tracts. PPLO were isolated in 92% of 180 semen samples, and from 60% of the oviducts of one group of females and from 92% of a second group. In general, the strains obtained from the reproductive tracts grew more rapidly than those from the respiratory tract. There were also differences in amino acid requirements. There was lack of correlation between recovery of PPLO from the semen and oviduct and the serum plate agglutination test.

Miscellaneous

An acute respiratory disease of quail caused by a virus-like agent was reported by DuBose, *et al.*, Texas A. & M. College. The agent isolated appears to be identical to one described by Olson (*Proc. U.S.L.S. Sanit. Assn.*, 171-174, 1950).

Mycostatin® (Squibb) was found by Yacowitz, *et al.*, Squibb Institute for Medical Research, to be specific against *Candida albicans* and to prevent spread of disease caused by it in chicks.

The only paper on Newcastle disease (ND) was one by Markham, *et al.*, American Cyanamid Co. This concerned some further observations on duration of passive immunity and its influence on vaccination response. They reported that high levels of H.I. antibody at time of primary vaccination appear to suppress the H.I. response to vaccination. None of the vaccinated birds, even with antibody levels as high as 1:4096 at time of vaccination succumbed to challenge with virulent ND virus.

·VM·

In 1956 the per capita consumption of poultry meat (turkey and chicken) was 28.8 lb. This is in comparison to 163.5 lb. of red meat eaten per person. Broken down into animal species, the per capita consumption of beef was 92.8 lb. of pork 66.3 lb. and lamb 4.4 lb.

Practitioner's Laboratory

W. L. SIPPEL, B.S., M.S., V.M.D., Ph.D.

Preparation of Blood Smears

The preparation of blood smears is a simple and may seem to be hardly worthy of discussion. However, experience in diagnostic laboratories indicates that this simple procedure could well be reviewed.

The primary difficulties appear to be the use of unclean slides on which too much blood is placed, resulting in smears that are too thick for proper examination.

Cleaning and Storing Slides

Slides or cover slips for blood smears should be prepared ahead of time so as to be available when needed in the car or office. We prefer 3 x 1 in. slides with frosted ends on which an identification can be written. Cleaning of new or used slides *is essential.* This can be most easily accomplished by soaping well with the fingers and dropping in a container placed under a flowing hot water tap. When all slides are washed, they are further rinsed thoroughly under flowing hot tap water. When all have been rinsed, they are dried with a lint-free towel and stored in a slide box with a tight lid. Such boxes of plastic or wood are inexpensive and available from laboratory supply houses.[1] Clean slides in these boxes can be conveniently kept in the office and car.

Preparing the Smear

Placing a sufficiently small drop of blood on the slide requires some finesse. It can not be accomplished by placing the slide in a stream of blood coming out of a needle in the jugular or some other vein. However, if the needle (18-20 gauge) is withdrawn, a drop (about 4 mm. in diameter) can be placed on the slide by touching it to the bevel of the needle. Figure 1 illustrates the proper size drop on a 3 x 1 in. slide. A prick of the ear will often provide a sufficient drop of blood. The slide should touch only the drop of blood, not the hair of the ear, at the time blood is placed on the slide.

To secure a thin smear, the slide containing the blood (no. 1) is placed on a firm surface or held in the fingers, and a second clean "spreader" slide backed into the drop of blood at a 30 to 45 degree angle. The blood will run to the sides by capillary attraction. When it has spread nearly to the edge, the spreader slide is forced gently along the surface of slide no.

Fig. 1. Size of drop of blood desirable for making blood smear.

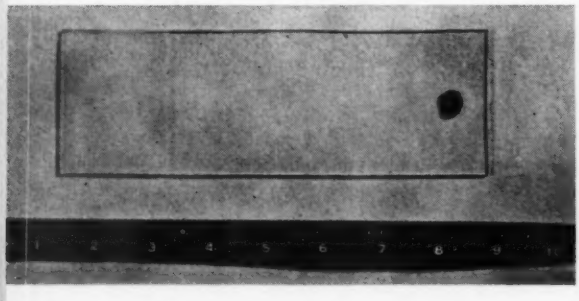
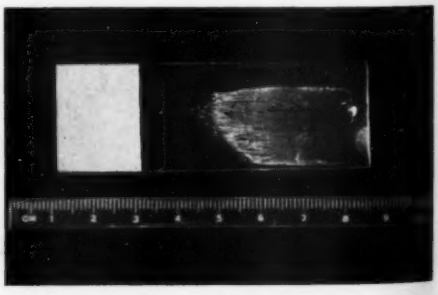


Fig. 2. Extent of area covered by good smear. Streaks in smear indicate a dirty slide or rough-edged spreader.



1. If the proper size drop of blood has been used, the smear will not extend the full length of the slide. (Fig. 2.) This will assure a thin film for critical examination.

An important part of the technic is to hurriedly wave the smear in the air immediately after it is made to facilitate rapid drying. If this is not done, cells will shrink and have a crenated appearance.

If cover slips are used, a small drop (2 mm. in diameter) is placed on the surface of one and a second cover slip placed over it. When the blood has spread between them, they are separated with a lateral sliding motion (not lifted), and waved dry immediately. Properly prepared cover slip preparations are considered superior for differential blood cell counts as the leukocytes tend to distribute evenly over the surface. With microscope slides, there is a tendency for the larger neutrophils and monocytes to run to the edge, leaving the lymphocytes in the center.

Staining

Wright's or Giemsa's stain are the most frequently used, with the former being preferred since it is faster. Wright's stain contains methyl alcohol, making a separate step for fixation unnecessary. The principal difficulty with Wright's stain is in the formation of precipitates on the slide, which are confusing if an anaplasmosis examination is being made. These can be avoided largely by using neutral distilled water and by careful attention to step 5 below.

Technic for Wright's Stain

1. Using a dropper, flood the slide with Wright's stain.

2. Allow to act for one to five minutes, depending on the batch of stain.

3. Add neutral (buffered pH 7.0) distilled water (obtainable from veterinary supply houses or the drug store) drop by drop directly to the stain until equal amounts of stain and water are on the slide.

4. Allow to stain for three to eight minutes.

5. Flood the slide with neutral distilled water so as to cause the "scum" formed by the stain-water mixture to be washed off of the slide without settling on it.

6. Allow to dry and examine with the oil immersion lens.

An alternative method uses two screw capped Coplin jars[2] to preserve solutions. One contains methyl alcohol in which the slide is placed for five minutes to fix it. It is then placed for two to four minutes in the second jar, which contains 30% Wright's stain powder in distilled water. The slide is then washed in water, dried, and examined. The stain is good indefinitely and more is added as needed. It is economical in the long run and avoids precipitates on the slide.

The blood smear is valuable in diagnosing parasitic diseases of the blood, such as anaplasmosis or canine babesiasis (piroplasmosis), making differential white blood cell counts for purposes of diagnosis or following the course of an infection, and in determining the relative amount of hemoglobin present in the erythrocytes.

Blood smears can be prepared from blood to which an anticoagulant has been added. However, fewer distorted cells and "smudges" will be found if the smear is made directly from the animal. Slides to be sent to another laboratory should be fixed in methyl alcohol for one minute before mailing.

[1]Cat. No. 7059A, about $0.50 each. [2]Cat. No. 9196S, about $0.75 each. A. H. Thomas Co., W. Washington Sq., Philadelphia 5, Penna.

Leptospirosis Vaccination

McDonald and Rudge (*New Zealand Vet. Jour.*, Sept. 1957) report favorably on vaccination of cows in late pregnancy with *L. pomona* vaccine. They summarize the report with the conclusion that "the vaccination of cows with either alum percipitated or freeze dried vaccine on two occasions in late pregnancy will protect calves from infection during their first month of life."

Books reviewed in this department and any other books, if available, may be obtained by remitting published price to the Book Department, VETERINARY MEDICINE, Suite 803 Livestock Exchange Building, Kansas City 2, Missouri.

Practitioner's Bookshelf

THE ARABIAN HORSE IN AMERICA, by *Dr. George H. Conn,* formerly veterinary practitioner in Ohio, horse breeder, and veterinary editor of The National Horseman. 308 pages, profusely illustrated. The Countryman Press, Woodstock, Vermont. — Price $7.50

The author states in the preface that the principal aim and purpose of this book is to put into permanent record matters concerned with the introduction of Arabian horse in this country and their influence on the light horse breeds

Exhaustive research and study of many publications and detail papers maintained as farm and breeding records, newspaper and magazines served to establish the lineage of horses imported into this country from England in 1730. Arabians were almost certainly to have been imported prior to the 18th century since it is probable that Spanish horses were brought into Florida by de Soto (1539) and into the Rio Grande country by Coronado (1540) traced back to Arabian bloodlines. Even the Mustang that came to dominate the western plains sprang from Spanish stock and similar background.

Carefully quoted material is used extensively which allows reader interpretation and independent judgment concerning bloodlines, families, and other matters regarding which there is still considerable controversy among breeders. Records are given of many and perhaps most of the important Arabian studs in the country.

The growth of the Arabian in American has been rapid. Breeders have demonstrated the versatility of these fine animals not only as working cattle horses in the deserts or mountains, but as trail, parade, or pleasure mounts.

POULTRYMAN'S MANUAL, by *J. W. Bailey, D.V.M.,* 296 pages, Springer Publishing Company, Inc., New York, N. Y., publishers, 1957. Price—$4.50.

That Poultryman's Manual is precisely a manual and less a textbook is at once the virtue and the weakness of this work. The intention of the author is apparently to give both a pedagogical tool and a manual for the novice in poultry raising at the same time. The work, however, emerges not so much as a classroom text, but as a carefully organized, oriented manual for the flock owner and agricultural student.

The book is balanced between practical pointers and flock health and discussion of some 140 poultry diseases developed in brief outline. The author argues that it is futile to replace veterinary services with home instruction lessons, but observes that more than cursory knowledge of poultry diseases is necessary to the successful poultry grower.

If this work is to be evaluated in terms of what it sets out to do, it must be considered a success. In dealing with most of the topics which regularly appear in the manual treatment of this subject, and with some which appear less frequently, Doctor Bailey always proceeds in an ordered, systematic, and specific manner first. The book is only secondarily appealing. When he stops to analyze and evaluate a topic, the analysis is clearly stated in terms of criteria consistently applied. Illustrations are excellent.

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CLINICAL USE SHOWS RAPID HEALING OF:

- dermatoses ringworm, fungus infections, eczema, hot spots, acute erythematous and moist dermatitis
- otitis externa
- minor cuts and wounds
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- pyogenic infections

No resistant organisms have been reported.

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Now your Triocil treatment for dogs, cats and large animals can be faster and easier than ever! Triocil Spray is now available . . . with a penetrating alcohol-acetone base . . . conveniently packaged in a 50 ml. squeeze bottle. Also in ointment and solution (shampoo-like detergent base).

Triocil Spray is effective against practically all organisms that cause or complicate skin infections. And you will find Triocil Spray invaluable for pre-surgical preparation. Because Triocil has high tissue affinity, it resists licking and rubbing off—leaves a faint, identifying pink color on the skin. Pleasantly scented!

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DIVISION OF VETERINARY MEDICINE
WARNER-CHILCOTT
LABORATORIES, MORRIS PLAINS, N. J.

When metabolic imbalance complicates dermatologic problems . . . use Anabolin as adjunctive therapy.

58-2

A Good Veterinarian Avoids

1. Standing directly in front of a horse when working around the head.

2. Touching an animal without first talking to it in an assuring tone of voice.

3. Leaving a mouth speculum or twitch or any other uncomfortable apparatus on longer than is necessary to get the job done.

4. Yelling or scaring an animal just to see it move.

5. Squirting milk on the floor to check the udder.

6. Kicking an animal to make it get up.

7. Leaving a muzzel on a dog when not necessary.

8. Letting go of the thermometer while waiting to take temperature.

9. Keeping an animal tied on a table unnecessarily.

10. Using a general anesethetic when a local will do.

11. Considering the convenience of the veterinarian ahead of that of the patient.

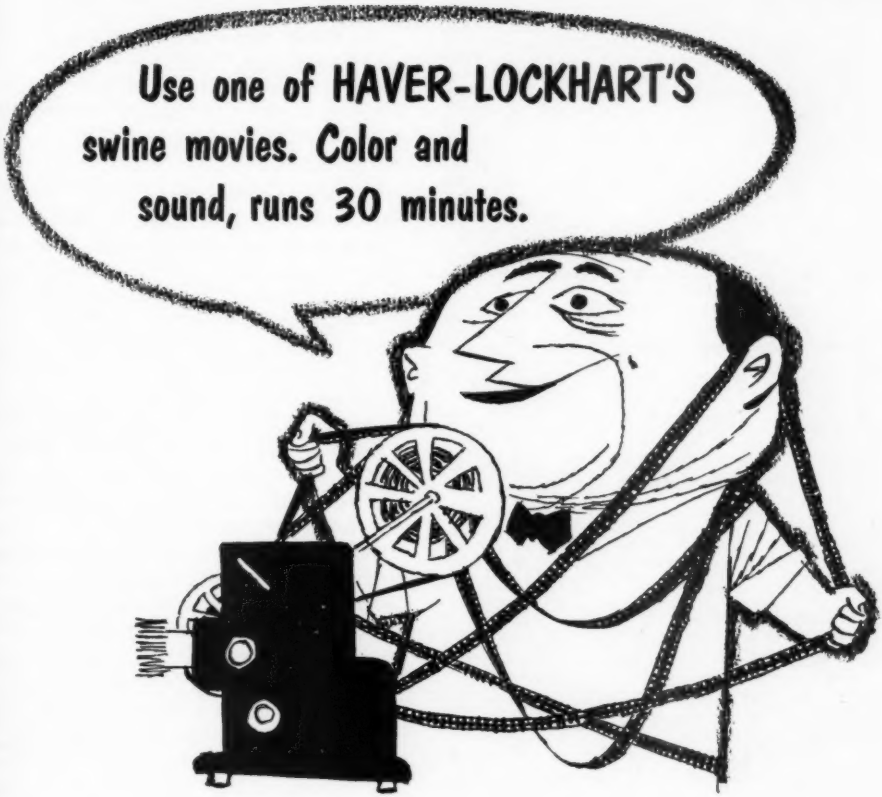
12. Neglecting the bedding water and food supply and general comfort of the patient because of medication.

—E. J. Frick, D.V.M.

Feat Saint Louis Veterinarians

Twelve veterinarians of the Greater St. Louis, Mo. area who have practiced for 45 years or longer were honored at appropriate ceremonies at a special meeting of the St. Louis Veterinary Medical Association. Mr. J. H. Williamson, state commissioner of agriculture, was the featured speaker.

Veterinarians cited for special honors were C. F. W. Bauer, Floressant, Mo.; George W. Leber, Pacific, Mo.; O. T. Murphy, Kirkwood, Mo.; H. J. Schlesinger, New Athens, Ill.; L. J. Miller, Waterloo, Ill.; W. G. Teckenbrack, East St. Louis, Ill.; R. R. Downing, East St. Louis, Ill.; Joseph Emonts, St. Charles, Mo.; and W. E. Beckman, St. Louis, Mo.



COMMON DISEASES OF BABY PIGS — Vivid new film showing widespread diseases of pigs under nine weeks old. Shot under authentic field conditions.

PARTNERS FOR HEALTHIER SWINE — Drives home the need for a working partnership between owner and veterinarian; shows diseases of older swine.

To schedule either movie, just tell your Haver-Lockhart man, or write us in Kansas City.

Another personal service for you from **HAVER-LOCKHART** LABORATORIES

58-2

Classified Advertisements

Twenty-five words or less, $3.50—minimum charge; additional words 10 cents each. Replies sent care VETERINARY MEDICINE. 50 cents additional to cover forwarding postage. Remittance must accompany order.

Names of classified advertisers using V. M. key numbers can not be supplied. Address your inquiry to key number care VETERINARY MEDICINE, Suite 803, Livestock Exchange Building, Kansas City 2, Missouri, and it will be promptly forwarded to the advertiser.

Deadline for copy — 5th of month preceeding date on issue.

For Sale

CHARTS: $1. each, 3 for $2. Terrier Trimming: All American Dog Breeds; World Dog Map. Subscribe to Dog World (3323 Michigan Blvd., Chicago 16)—$3. one year, $5. two years.

INVENTORY AND PRACTICE: Central Illinois, $5,000. No real estate. Gross over $20,000. yearly last 5 years. Mixed Practice. Reason for selling; leaving private practice. Address box 402, care VETERINARY MEDICINE.

GENERAL PRACTICE: $16,000. annual gross. Swine, beef, dairy cattle. Clients pay well; 60% own farms. Modern home and office. Terms. Address box 403, care VETERINARY MEDICINE.

SMALL ANIMAL HOSPITAL: Also living quarters, in Los Angeles suburb. Established 17 years. No real estate. Very reasonable rent. Good lease. Address box 404, care VETERINARY MEDICINE.

MODERN SMALL ANIMAL HOSPITAL: Central Illinois. Near large city. 42 cages, eight runs, seven rooms, separate cat ward. Completely equipped. Large animal potential. Reason for selling — ill health. Address box 406, care VETERINARY MEDICINE.

MOTOROLA: Two-way radio system complete: base station, mobile station, antennae, coaxial cable, in good working order, licensed: factory rebuilt to meet all requirements present and future. Fifty watts mobile, 50 watt base. Crated and shipped f.o.b. upstate New York. $400. for quick sale. Address box 407, care VETERINARY MEDICINE.

MIXED PRACTICE: 17 year old mixed practice located in North Alabama County seat, good clientele, grossed $21,000 yearly for last five years. Asking real estate value $18,500. Address box 408, care VETERINARY MEDICINE.

Wanted

PRACTICE IN MIDWEST: Desire to purchase or lease. Will consider position leading to partnership. Address Box 401, care VETERINARY MEDICINE.

VETERINARIAN: Busy small animal hospital in Boston area. Massachusetts license essential. Please send resumé of qualifications and experience. State salary required. Address Box 405, care VETERINARY MEDICINE.

WANTED: January 1958 issues of VETERINARY MEDICINE. Your subscription will be advanced one month for each copy. Mail to VETERINARY MEDICINE, Suite 803 Livestock Exchange Bldg., Kansas City 2, Missouri.

Silent Partner Insurance Values

In those states where official approval and sponsorship has been extended the D.V.M. Silent Partner income protection insurance program, policy holders enjoy security against catastrophes of an exceptional order.

Actually, state groups enjoy their own insurance sans headaches, financial investments, and operating problems. The "home-rule" feature assures review of any member's claim by the state Veterinary Insurance Committee that might be questioned. At the same time individual insured members have nation-wide security against company cancellation. The underwriters, Continental Casualty Company of Chicago, pioneered income protection for professional groups of which the veterinary profession is one. Rates are based on a nation-wide mutual cooperative experience rating in which all insured members participate. This gives permanence and stability to an insurance program that is no experiment. A record of 12 years of successful operation is open for examination by interested parties.

There are built in intrinsic values in the Silent Partner plan that may not be apparent to any but the insurance-wise. An insurance counselor or broker can help in the analysis of the program that has meant assured monthly income during periods of recovery from crippling accidents or confining illnesses.

The newest feature, catastrophe Hospital-Nurse-Surgical coverage, on a deductible basis (similar to automobile collision insurance) provides for payment of all medical bills for the veterinarian and his family

GELATIN CAPSULES

1 ounce

We have a steady supply

Lots of 100	$ 5.95
50 free with each 300	17.85
100 free with each 500	29.75

Terms: Net cash

½ ounce and 1½ ounce sizes can be made available if wanted.

Shipped prepaid same day.

PRACTITIONERS FORMULA HOUSE

South Windham, Connecticut

in the event of sudden illness or crippling accident.

Development of the over-all plan or plans has been good news for veterinarians since 1945. Readers are invited to write Silent Partner Associates, Veterinary Dept., Box 824, Evanston, Ill., for further information which will allow comparison with any other insurance plan available.

Spring Pigs

The nation's swine growers have indicated intentions of a 6% increase in the 1958 spring pig crop (USDA announcement). This is less than previous intention figures anticipated by trade sources, lessening likelihood of badly breaking price levels.

The decision was seen in some quarters as an indication that the government agricultural policy of providing adequate information concerning market demand, thus allowing growers opportunity to solve most of their problems by means of their own devices.

MASON'S New KENNEL RUNS
NOW AVAILABLE
For SMALL ANIMAL HOSPITALS
Quickly Erected - NO POSTS REQUIRED
Can be set on concrete or wood floors or directly upon the ground, joining in, or independent of Building. Composed of strong, self-supporting Fence sections and Gate Units with GATES BUILT-IN and Lockable Latches.
FREE CATALOG
Send for Free Catalog with Low Direct Factory Prices of Kennel Fences of all kinds, Kennel Doors, Cages and Hospital Equipment.
THE MASON FENCE CO., Box 77, LEESBURG, OHIO

Enzyme supplements to feed containing barley effectively improve its value in livestock rations, according to experiments conducted at the State College of Washington.

Feeding trials are being continued to determine economic feasibility of the use of several enzyme preparations.

CURTS CURTS

Antacid Detoxicant Stimulant Laxative

BOVIDOTE®

(100% active ingredients)

℞ Each pound contains: Anhydrous magnesium oxide (quantity sufficient to make 1 gallon of milk of magnesia) with a therapeutic dose (8 oz.) of sodium thiosulfate; plus sufficient quantity of tartar emetic and nux vomica for rumen stimulation

The original formula emphasizing the chemical detoxifying action of sodium thiosulfate together with its laxative action

DOSE: Adult cows 1 lb. suspended in 1 to 3 gallons water via stomach tube

OFTEN IMITATED — NEVER EQUALLED

PACKAGES: Cartons of 12—1-lb. jars: 25 lb. plastic lined drums

order direct or from your nearest CURTS distributor

CURTS Laboratories, Inc.

Manufacturers of Veterinary Pharmaceuticals Since 1918

70 Central Avenue Kansas City 18, Kansas

DEODORANT
DAIRMOL
ANTISEPTIC

FOR SKIN & ACCESSIBLE MUCOUS MEMBRANES
OF ALL DOMESTIC ANIMALS

Also excellent for care of hands and instruments—
Non-caustic. Non-irritating.
Recommended for lubricating hands and arms; deodorizing and soothing qualities particularly desirable in removing retained placenta, etc.
Dairmol cleanses, retains cutting edge of instruments without corrosion.

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DAILY LOG
RECORD SUPPLIES FOR VETERINARY PHYSICIANS
WRITE FOR FREE CATALOG

A complete line of Record Supplies and Professional Stationery designed specifically for the medical profession.

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- Appointment Book
- Printed Stationery
- Patients' Records
- File Guides
- Payment Records

NEW 1958 EDITION

COLWELL PUBLISHING CO.
283 University Ave., Champaign, Ill.

Consolidated Veterinary Division at Upjohn

A new division of the Upjohn Co., Kalamazoo, Mich. formed by the consolidation of four departments concerned with research, advertising, sales, and medicine will be headed by Dr. Gordon G. Stocking, according to release from the director.

Purposes given for the action is to integrate veterinary activities within the company which is expected to define needs and accelerate new product development.

World Poultry Congress

The first World Poultry Congress to be held in North America in 19 years will convene in Mexico City September 21-28, 1958.

The Congress is sponsored by the World Poultry Science Association. Regularly scheduled every three years, this the 11th meeting will be the start of quadrennial meetings. Cleveland, Ohio was the host city for the Congress in 1939.

LIQUID ADHESIVE COAL TAR

EPIDOL

EPIDOL is a clear, **adhesive, non-greasy** rapidly drying, improved Wright's Liquor Carbonis Detergens plus Salicylic Acid 3%.
EPIDOL is superior to messy ointments . . . . . requires no bandaging.
EPIDOL is easy to apply. Applicator comes with every bottle.
EPIDOL is easy to remove. Readily washes off with soap and water.
EPIDOL is therapeutically rapid and effective.
EPIDOL is for use in the treatment of skin conditions where coal tar therapy is indicated.

Supplied: Bottles with applicators: 3 fl. oz. $36.00 per dz.
6 fl. oz. $60.00 per dz.

Bottles: 16 fl. oz. for dispensing each $12.50
Less discount of 33 1/3%

You may order direct or we will drop ship and bill through your distributor.

Also **LIPAN** capsules or tablets—oral therapy for pancreatitis or upsets of the digestive system. Each capsule or tablet contains:
Whole pancreas produced by an exclusive, special cold process. It is indestructible in the gastric juices. Therefore, they require no enteric coating. Utilization takes place in the stomach and duodenum where activity is required. It has at least three (3) times the standard U.S.P. amylolytic, lipolytic and tryptic activity.
LIPAN is further fortified with thiamine HCl 1.5 mg. and vitamin D 500 I.U.
LIPAN capsules are supplied in bottles of 500's @ $25.00 each

Send your orders to:

SPIRT & CO., INC.
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Veterinary products of Spirt & Co. are sold only to licensed veterinarians.

INSECTICIDES

SPECIFICALLY FOR THE CONTROL OF RESISTANT INSECTS

. . . Fleas, Ticks, Flies and So Forth

For the first time VET-KEM brings to you — the graduate veterinarian — IMMEDIATE ADVANCEMENTS in the science of external parasite control.

VET-KEM insecticides, *sold only to graduate veterinarians*, are tomorrow's products today . . . consistently advanced in formulation through constant forward-looking research and thorough testing.

With VET-KEM in your hospital you'll be out in front scientifically . . . equipped to whip the resistant insect problem.

KEM-TOX
Livestock Dip and Spray

KEM-SPRAY
General Insecticide

KEM-SMEAR
Screw Worm Remedy

GRUB-KIL
Rotenone-BHC Grub Killer

KEM-DUST
Kills Fleas, Lice, Etc

KEM-DUST

Highly effective for cats and dogs. Kills resistant and non-resistant fleas and ticks . . . checks fungi infections, dermatitis, skin diseases.

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STEVENSON, TURNER & BOYCE, Guelph, Can.
TEXAS VET. SPEC. CO.
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Developed and Manufactured by
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A Division of Agricultural Specialties
10219 Denton Drive • DALLAS, TEXAS

This department will announce each issue new therapeutic items, equipment, services, and literature of interest to veterinarians. All claims made are those of the firms concerned. Send communications to the address noted.

Reader's Service

Hymix® (Hygromycin B), a new swine anthelmintic, is now available to practitioners. Corn States Laboratories, Omaha, Nebr., has received F.D.A. clearance for a vermifuge swine feed premix designed as a dispensing item for droves of swine in which continuous supplementation is indicated. Control of common intestinal parasites (Ascaris-Trichuris-Oesophagostomum) is claimed when fed as directed. Additional benefit include increased rate of gain and improved feed conversion. Hymix contains substantial quantities of antibiotic and vitamin B_{12} activity. For more details, write Corn States Laboratories, 1124 Harney Street, Omaha, 2, Nebr.

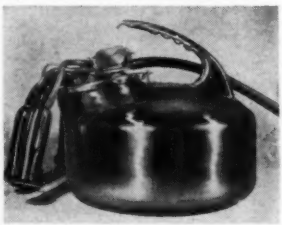
Veterinary Indications for Desitin® ointment and powder are covered in a new, illustrated brochure available free from Desitin Chemical Company, 70 Ship Street, Providence 2, R. I.

U-Bild Units, suitable buildings for use by farmers, and some veterinarians, feature durable aluminum construction, and are completely fabricated and ready to be assembled. For further information write J. B. Sebrell Corporation, 300 South Los Angeles Street, Los Angeles 13, Calif.

Administration of Phenothiazine by the oesophageal method is faciliated with the Phen-Master Internal Drencher, now available in the United States and bordering countries. For data ask Lobel Chemical Corporation, 165 Broadway, New York 6, N. Y.

Touring with Towser, an unusual aid for vacation-bound dog owners, is a 68 page directory which lists establishments in every state that accept guests with dogs. Also included are handy tips on what to take along, special regulations in the various state and national parks, and requirements for entering Canada and Mexico. For a copy, send 25 cents to Gaines Dog Research Center, 250 Park Avenue, New York 17, N. Y.

A Surge® Bucket Milker with a looking-glass finish inside and out makes it difficult for material of any kind (especially milkstone) to accumulate. Since annual milk production per cow has increased better than 1,000 lb. in the past 10 years, capacity of the new bucket has been increased for all three sizes. Improved angle of the lid better distributes tug and pull on each quarter, substantially reducing milking time



Babson Bros. Company

in most herds. The unit has been proved well-suited for hard-to-milk cows, especially those with uneven udders or those slow to let down milk. The new seamless bucket is made of 18/8 stainless steel. For more information, ask Babson Bros. Co., 2843 West 19th St., Chicago 23, Ill.

Cosa-Tetracyn, the first product incorporating glucosamine, will be marketed in February by Chas. Pfizer & Co., Inc. Glucosamine is a non-toxic substance that when added to antibiotics improves and speeds absorption in consistently greater quantities than possible in the past. Cosa-Tetracyn has proved in clinical trials to be an effective and well tolerated antibiotic.

Epidemic, Foot-and-Mouth Disease in Canada, a color and sound 16 mm. movie film has been distributed to film libraries at Cornell University, University of Minnesota, Ohio State University, Washington State College, University of California, Colorado State University, Texas A. & M. College, Iowa State College, University of Missouri, Alabama Polytechnic Institute, University of Georgia, Michigan State University and University of Pennsylvania. This film is available for showing at local, state, or area meetings. Check with any of the listed film libraries.

Gallimycin Injectable designates a new injectable antibiotic form especially suited for poultry. One injection is usually sufficient for effective treatment for chronic respiratory disease (CRD), infectious sinusitis, coryza, staphylococcosis, and synovitis (PPLO). For details ask Abbott Laboratories, North Chicago, Ill.

Antrate H.C., a concentrated hog blood fraction twice as potent as hog cholera antiserum, permits the standardization of antibody content and elimination of side reactions. It is now available. The new material is made by fractionating blood of hyperimmune hogs concentrating immune bodies. Armour Veterinary Laboratories claim faster vaccination since only half as large a dose of antrate H.C. compared to antiserum is needed for passive protection. It must be used simultaneously with hog cholera virus or modified live-virus vaccines for immunization, but can be used alone for temporary immunity. For dosage and recommended variations, contact Armour Veterinary Laboratories, Kankakee, Ill.

Kills

vegetative pathogens and spore formers within 5 minutes

the spores themselves within 3 hours

tubercle bacilli within 5 minutes

infectious canine hepatitis virus within 5 minutes

BARD-PARKER
FORMALDEHYDE
GERMICIDE

This solution is specifically indicated for the practical and economical chemical disinfection of surgical 'sharps.' When used as directed, it will in no way impair keen cutting edges, points of hypodermic needles, scissors and other delicate instruments . . . an annual savings in instrument replacement and repair will far exceed the actual cost of the solution. If kept undiluted and free of foreign matter, it may be used repeatedly.

It's
SPORICIDAL
TUBERCULOCIDAL
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B-P INSTRUMENT CONTAINERS
Designed with your convenience in mind for use with Bard-Parker GERMICIDE

Ask your dealer

PARKER, WHITE & HEYL, INC.
Danbury, Connecticut

ALL BARD-PARKER SOLUTIONS
CONSERVE THE BUDGET DOLLAR

New Personalities in Executive Positions at Pitman-Moore Company

Four new vice presidents, a treasurer, associate director of the firm's biological laboratories, and assistant secretary have been named by Pitman-Moore Co.

The new vice presidents include Stewart E. Ruch, director of sales; Dr. S. R. Bozeman, director of the company's biological laboratories; Dr. C. A. Bunde, director of research; and Harry Sefton, director of personnel. Allen B. Faux is the new treasurer. E. F. Andrews was named associate director of the biological laboratories and John R. Jewett assistant secretary.

Mr. Ruch, who is a graduate of Purdue University School of Pharmacy, joined Pitman-Moore Company as a salesman in 1940. Before becoming sales manager in 1955 he served as assistant sales manager and Eastern Zone Sales Manager.

Dr. Bozeman has been director of the biological laboratories near Zionsville since joining the company in 1952. He has a Ph.D. degree from the Virginia Polytechnic Institute.

Dr. Bunde, who holds a Ph.D. degree from the University of Wisconsin as well as a Doctor of Medicine degree from Southwestern Medical College, has been director of research since 1949.

Dr. S. R. Bozeman

Mr. Sefton joined the pharmaceutical firm

Keep Teat **OPEN** Keep it **MEDICATED**

Keep it ***MILKING***

INJURED TEATS, SCAB TEATS, STENOSIS, POST-OPERATIVELY

To maintain unrestricted milk flow and provide antiseptic protection is of first importance in the successful treatment of teat troubles. Dr. Naylor Dilators act both MEDICALLY and MECHANICALLY to provide broad spectrum germicidal activity and gentle, non-irritating support to traumatized sphincter and teat mucosa.

Contain Sulfathiazole — the self-contained anti-microbial medication in Dr. Naylor Dilators provides full time antiseptic activity in the entire streak canal. They do not depend upon packaging ointment for antiseptic or therapeutic properties. The medication is IN the Dilators and is released slowly IN the teat to combat infection, reduce inflammation and keep streak canal open to promote normal healing, natural milking. Positive retention in large or small teats!

WITH ANTIBIOTICS

Dr. Naylor Dilators are an ideal vehicle for additional local medication of your choice. To obtain the synergistic bactericidal action of Antibiotics with Sulfathiazole following teat surgery, saturate with your favorite udder infusion antibiotic.

Dispensing Package
16 Dilators

Dr. Naylor's

MEDICATED

Large Pkg. 41 Dilators ***Teat Dilators***

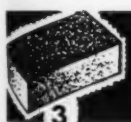
H. W. NAYLOR CO., Manufacturing Chemists, **MORRIS, N.Y.**

in 1950 as assistant personnel director and became head of that department in 1952. He is a graduate of Duquesne University in Pittsburgh. Mr. Faux, who is a graduate of Indiana University, became chief accountant in 1950 and was promoted to comptroller of the firm in 1954. Mr. Andrews has been with Pitman-Moore since 1946 when

Mr. E. F. Andrews

he became assistant purchasing agent. In 1948 he was named director of purchasing and earlier this year became assistant to the director of the company's biological laboratories. He is a graduate of Butler University.

Mr. Jewett became associated with Pitman-Moore Company in 1948. He was director of market research until 1951 when he became assistant to the advertising manager. In 1953 he was named assistant to the Executive Vice President. Mr. Jewett is a graduate of DePauw University.



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3 PADS FOR $1.00 POSTPAID
KEN-L-KLEENER
Made only by Pat. No. 2650158

is endorsed by leading veterinarians for safe, effective cleaning of plastic kennels.

It is the "softest", "spongiest" scouring pad made . . . it absolutely will not scratch, cause mars or abrasions on kennel walls or floors where dangerous germs can accumulate.

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no side effects from THERAPOGEN

the proven effective germicidal agent

You'll find THERAPOGEN virtually free of side effects and toxicity. Its completely effective yet mild cleansing action has been found excellent for obstetrical work by veterinarians for many of the finest horse breeding farms in Kentucky. Inexpensive THERAPOGEN may be ideal for your needs, also.

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PROFITABLE!

Yes...for profitable, humane animal clipping, grooming and surgical shaving . . .

You'll do better with Oster®
the Veterinarian's clipper

MODEL A-2

John Oster MANUFACTURING CO., Milwaukee 17, Wis.

Armour

now gives you a choice-

2 great, new hog cholera VACCINES

ARMOVAC A WITH SERUM

ARMOVAC WITHOUT SERUM

These two vaccines produce a solid [illegible] to hog cholera in pigs without harm[illegible] They minimize post-vaccination difficu[illegible] virus is fixed in its characteristics an[illegible] spread from vaccinated pigs to othe[illegible] infect the premises.

2 TWO-WAY [illegible]MODIFICATIO[illegible]

greater safety- increased [illegible] profits- protected investment

Armour

VETERI[illegible]RY LABORATORIES

A Division of [illegible]

Kankake[illegible]

For the Little Fellows

improved

CALF SCOUR COMPOUND

3-WAY ANTIDIARRHEAL

CALF SCOUR VITAFORM

3-WAY ANTIDIARRHEAL
PLUS VITAMIN THERAPY

For the Newborn

The so important first ten days of life made safer—and sturdier young animals assured when you use

Calf Scour Compound

Dependable and proven effective in the field, this three-way antidiarrheal is used successfully in scours where vitamin deficiencies are not a problem. It . . .

- Exerts penetrating antibacterial action
- Neutralizes gastrointestinal toxicity
- Favors healing and protects mucosal surface

Formula: Phthalylsulfacetamide, Sulfaguanidine, U.S.P.; Salol, U.S.P.; Bismuth Subnitrate, U.S.P.; Calcium Carbonate; Calcium Gluconate U.S.P.; Chlorobutanol U.S.P.; Irradiated Yeast; Niacin (Nicotinic Acid); Special Oil Base.

Calf Scour Vitaform

Preferred by many because it contains added vitamins to correct vitamin deficiencies frequently preceding or accompanying diarrhea. A four-way antidiarrheal, it combines . . .

- Multiple sulfonamide therapy
- Gastrointestinal detoxification
- Soothing, demulcent action
- Helps replace depleted stores of 8 important vitamins

Formula: Same as Calf Scour Compound with the addition of Vitamin A, 56,000 U.S.P. units; Vitamin D, 5,600 I.C. units; Riboflavin, 10 mg.; Pantothenic Acid, .250 mg.; Ascorbic Acid, 125 mg.; Pyridoxine, .010 mg.; Choline, 10 mg. (Above quantities per 100 cc.)

Ever gaining in professional acceptance, both these products have been proven effective in diarrheas of calves, lambs, kids, foals, kittens and puppies.

Available in bottles of 350 cc. and 1 gal. Improved suspension is smooth, stable, and shakes up easily. Described in Veterinary Drug Encyclopedia.

Order today

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LABORATORIES
NEW CASTLE, INDIANA, U. S. A.

TOTAMIN

T. M. Reg.

- Amino Acids
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DOCTOR—Stop Profit Losses Due to MASTITIS

Sole Manufacturers

can help stop losses from milk rejections and the slaughter of good cows. Write TODAY for a full size box — FREE.

Sterling Research Corp.

Dairy Div. VM. Sidway Bldg. Buffalo, 3, N. Y.

Ralston Purina Announces Research Fellowship Awards

Continuing a program initiated ten years ago, the Ralston Purina Company, St. Louis, Mo. has announced its Research Fellowship Award program for 1958-59.

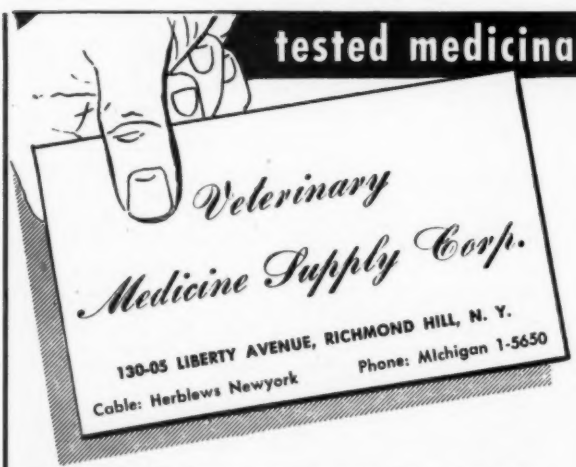
Scholarships for ten outstanding agricultural college students, including one in the field of veterinary science, will be offered students qualified for graduate study. Recipients of awards may be eligible for appointment not to exceed a tenure of three years. Amount of fellowship has been set at $1,800 annually.

Application blanks may be obtained by writing Mr. J. D. Sykes, Research Awards Committee, Ralston Purina Company, St. Louis 2, Mo.

·VM·

The Poultry Producers of Central California, a successful cooperative, processes 100,000 dozen eggs every 24 hours at its Sacramento plant.

tested medicinals direct by mail*



PENICILLIN TABLETS 300,000 Units with Triple Sulfa 100's $ 6.00

Check with order. Prices Subject to change without notice.

We are distributors for Sharp & Dohme, Pfizer, Armour, Winthrop, Clay Adams Instruments and Equipment and Bauer & Black Surgical Dressings.

PFIZER STERANE TABLETS—5 mg.	100's	$14.90
HYDROCORTISONE TABLETS— 20 mg.	100's	9.90
PENICILLIN G PROCAINE IN AQUEOUS SUSPENSION 3 million units 10cc	10 Vials	3.30
	100 Vials	31.00
DIHYDROSTREPTOMYCIN SOLUTION	5gm 10 Vials	7.30
	50gm 100 Vials	70.00
	200cc (50gm) Bottles	6.25
COMBIOTIC 10cc—5 dose Vial 4:½	(10 Vials—$6.60)	(100 Vials—$63.00)
TETRACYCLINE HCL— 250mg Caps.	100's	22.49
BACITRACIN OINTMENT 500 units per gm.	1 oz. tube 12's	6.95
PENICILLIN—DUOSTREP (SHARP & DOHME)—for Aqueous Injections—dry powder 4:½ — 5 dose Vial		.58
ATARAX INJECTABLE— 25mg per cc—10cc		3.75
NEOPRONTOSIL - - -	250cc	3.00
	6 x 250cc	15.00

nationally known antibiotics, therapeutics, hormones, biologicals, vitamins and pharmaceuticals for all animals

proven results in these diseases of small animals

CANINE TRACHEOBRONCHITIS (KENNEL COUGH). In one study of 12 cases, FURADANTIN stopped the cough completely within 3 to 7 days.[1]

URINARY TRACT INFECTIONS. Extensively used in human genitourinary tract infections, FURADANTIN has also produced impressive clinical results in the treatment of bacterial nephritis and cystitis of dogs and cats.[2]

* * *

Preliminary data point to new indications for FURADANTIN: Various reports describe encouraging results with FURADANTIN in the treatment of vaginitis in the bitch and genitourinary tract infections of mares.[2] Another article concludes that FURADANTIN is an excellent adjunct to surgery in the treatment of prostatic abscess in the dog.[3]

Like all the nitrofurans, FURADANTIN is bactericidal to a wide range of both gram-negative and gram-positive organisms. It is nontoxic to kidneys, liver and blood-forming organs; and development of bacterial resistance is negligible.

Available as orange scored tablets of 10, 50 and 100 mg.; and Oral Suspension, bottle of 60 cc.

REFERENCES: 1. Masler, J. E.: Vet. M. 50:605 (Nov.) 1955. 2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 3. Pollock, S.: J. Am. Vet. M. Ass. 129:274 (Sept.) 1956.

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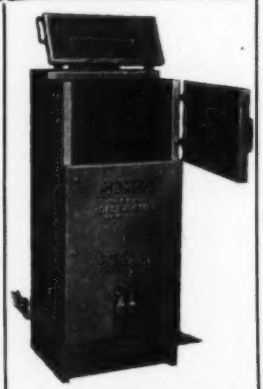

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Veterinary Calendar

Feb. 15-17. **Arkansas Veterinary Medical Association,** 42nd Annual Meeting. Hotel Marion, Little Rock, Ark. Dr. T. D. Hendrickson, 7824 Cantrell Road, Little Rock, Ark.

Feb. 16. **American Veterinary Radiology Society,** Hotel LaSalle, Chicago, Dr. J. J. Fishler, 600 S. Michigan St., Chicago 5, Ill., secretary-treasurer.

Feb. 16. **American Animal Hospital Association,** 4th Region Annual Meeting. Veterinary Clinic, Colorado State University, Fort Collins, Colo. Dr. D. T. Albrecht, chairman.

Feb. 17-19. **Colorado State University,** 19th Annual Veterinary Conference. Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Colo. Dr. Lloyd C. Moss, Department of Medicine.

Feb. 17-19. **Illinois State Veterinary Medical Association,** 76th Annual Convention. LaSalle Hotel, Chicago, Ill. C. B. Hostetler, 1385 Whitcomb Ave., Des Plaines, Ill., executive secretary.

Feb. 21. **Indiana Veterinary Medical Association.** Symposium on Therapeutic Nutrition (Co-sponsored by the Nutrition Committee and Vita Veterinary Laboratories), Marion, Ind., J. M. Carter, 3421 S. Main St., chairman.

Mar. 16-18. **Alabama Veterinary Medical Association.** Hotel Stafford, Tuscaloosa, Alabama. Dr. M. K. Heath, secretary.

Mar. 27. **Indiana Veterinary Medical Association and Indiana State Board of Health,** Conference on Public Health and the Veterinarian. Board of Health Auditorium, 1330 West Michigan Street, Indianapolis, Ind. Dr. Joseph D. Salisbury and Dr. Lowell W. Hinchman, 1330 West Michigan Street, Indianapolis, Ind., co-chairmen.

Apr. 17. **North Central Iowa Veterinary Medical Association,** Annual Meeting. Warden Hotel, Fort Dodge, Iowa. Dr. H. Engelbrecht, secretary-treasurer.

Apr. 23-26. **American Animal Hospital Association,** Annual Meeting. Drake Hotel, Chicago, Ill., Dr. Wayne H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.

May 5- 6. **Oklahoma Conference for Veterinarians.** College of Veterinary Medicine, Oklahoma State University, Stillwater, Okla. Dr. Lester Johnson, Department of Veterinary Medicine and Surgery, chairman.

Jun. 2- 4. **Michigan Veterinary Medical Association,** Annual Meeting. Grand Hotel, Mackinaw Island. Dr. Charles Coy, Hillsdale, Mich., general chairman.

Jun. 5- 6. **Texas A. & M. College,** 11th Annual Texas Conference for Veterinarians. School of Veterinary Medicine, College Station, Tex. Dr. R. D. Turk, conference chairman.

Jun. 23-25. **North Carolina State Veterinary Examining Board,** Washington Duke Hotel, Durham, N. C. Dr. James I. Cornwell, 65 Beverly Road, Asheville, N. C., secretary-treasurer.

Jun. 24-26. **North Carolina State Veterinary Medical Association,** 57th Annual Meeting. The Washington Duke, Durham, N. C. Dr. C. J. Lange, 3741 Hi-Point Road, Greensboro, N. C., secretary-treasurer.

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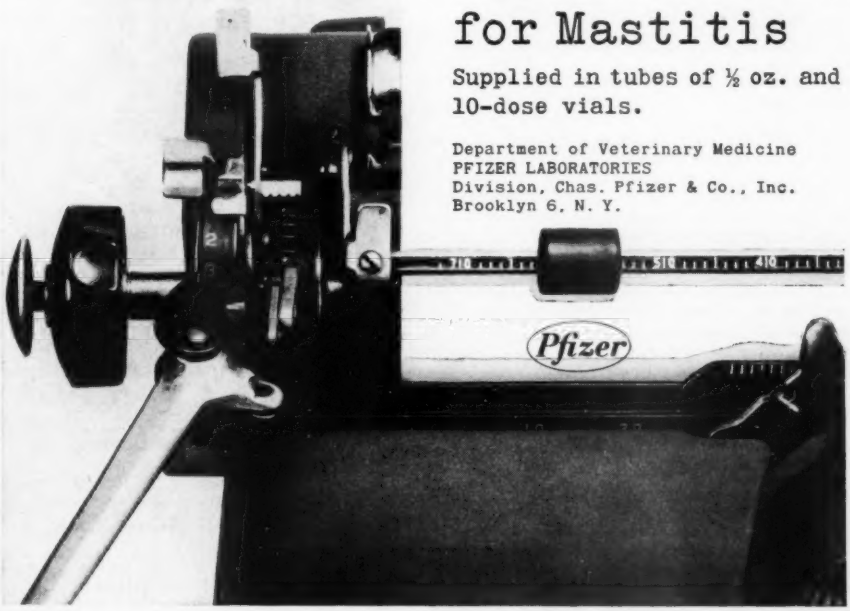

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Deaths of Veterinarians

J. W. BAER, KCV '12, 78, practitioner for 45 years; civic leader; stockgrower; at Malvern, Iowa, January 8, 1958.

H. E. BENDER, UP '01, at Lititz, Penna., November 15, 1957.

ADOLPH BERG, BER '06, 74, former president of the Pennsylvania State V.M.A.; long time member of the Doyles town school board, and its former president; of a heart attack at Chalfont, Penna., November 15, 1957.

HERBERT I. BURKE, CVC '10, specialist in small animal practice; active in social and civic affairs; of lung cancer at New York City, December 31, 1957.

BENJAMIN F. DAVIS, KCV '07, 79, former executive secretary of the Colorado Stockgrowers and Feeders Assn., (now Colorado Cattlemen's Assn.); former state veterinarian of Wyoming; long time manager of Cheyenne Frontier Days Rodeo; (his colorful career included gold seeking in Alaska, a job as circus veterinarian); after a long illness, at Denver, Colo., recently.

ELVON S. DICKEY, KCV '06, retired federal meat inspector after 30 years of service; nine years head of the veterinary department at the John Morrell Company; recently in charge of pharmacy department at the Ottumwa, Iowa hospital (he studied pharmacy at the University of Kansas, later taught the subject at Kansas City Veterinary College while studying veterinary medicine); of a heart ailment at Ottumwa, Iowa, November 6, 1957.

E. R. DIMOCK, KCV '10, at Merrow, Conn., December 19, 1957.

R. F. FLETCHER, CVC '18, at Platteville, Wisc., October 28, 1957.

H. M. GRAY, MCK '19; member of the A.V.M.A.; at Hampshire, Ill., November 6, 1957.

WALTER S. GROGAN, ONT '14, 71, former practitioner in Manitoba; recently, and until his retirement in 1954, member of the Health of Animals, Inspection Service Branch at Winnipeg; at Winnipeg, Ont., November 15, 1957.

CHARLES H. HART, CVC '11, at St. Paul, Minnesota recently.

HOWARD D. HILTON, MSC '25, 59, practitioner; member of the A.V.M.A. and the California V.M.A.; active in federal and state service from 1929 to 1943; practitioner at the Mill Valley Pet Hospital until retirement in 1951 due to failing health; of a heart attack at Mill Valley, Calif., October 12, 1957.

ALBERT G. HOEKZEMA, GR '15, 83, practitioner for 36 years in Michigan; after a several months illness at Bear Lake, Mich., September 15, 1957.

CHARLES A. HULBUSH, MCK '08, at Burlington, Wash. recently.

CHARLES G. JENNINGS, CVC '01, 85, retired practitioner after 50 years of service; member of the A.V.M.A.; at Morris, Minn., October 11, 1957.

ALVA A. JOHNSON, IND '18, member A.V.M.A., at Indianapolis, Ind., October 3, 1957.

ELMER C. JOHNSON, KCV '07, 75, practitioner at Mankato, Kans., well known for his interest in training and showing class saddle horses; member of A.V.M.A., Kansas V. M. A.; long time member of the Mankato town council; at Smith County Memorial Hospital, Smith Center, Kans., August 28, 1957.

EDWARD H. KILIAN, KCV '05, 86, retired practitioner at Manhattan, Kans., member A.V.M.A., Missouri Valley V. M. A. and the Kansas V M A.; of a cerebral hemorrhage, at Manhattan, Kans., July 19, 1956.

THOMAS J. KOSTER, UP '15, 64, former state veterinarian; city veterinarian for city of Philadelphia for 15 years; veteran of the Army Veterinary Corps in WWI; at Philadelphia, August 11, 1957.

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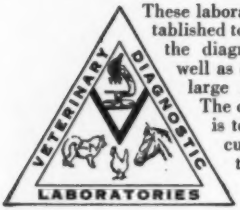

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